

Final report

OWMC
Ontario
Waste Management
Corporation

A provincial crown corporation

ier
Institute of
Environmental
Research Inc.

JACK B. ELLIS AND ASSOCIATES
LIMITED

SITE SELECTION PROCESS
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PREFERRED SITE(S)

Social Analysis Appendices

Volume 5
Comparative and Parallel
Studies of Tourism Impact

JACK B. ELLIS AND ASSOCIATES LIMITED

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December, 1985

Institute of Environmental Research, Inc.
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Attn: Dr. Peter Homenuck

Dear Dr. Homenuck:

With this letter, I am pleased to transmit the final report of my comparative and parallel studies on tourism impacts for the Ontario Waste Management Corporation.

For ease of reading the two distinct aspects studied, the report is presented in two parts. Part One, Case Studies, deals with the comparative and parallel studies of tourism impact from waste management facilities that were conducted at the Rollins waste management facility in Texas, and in Niagara Falls, New York, on the period following the Love Canal situation. Part Two, Volumes, deals with the amount of tourism and the patterns of its circulation around the OWMC's candidate sites, and discusses the various factors involved in creating a tourism impact.

It has been a pleasure to be involved in this study, and I hope that the report will be of interest and value to you and to the Corporation.

Yours truly,



Jack B. Ellis, President

PART ONE: CASE STUDIES

COMPARATIVE AND PARALLEL STUDIES
OF TOURISM IMPACT FROM
WASTE MANAGEMENT FACILITIES

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EXECUTIVE SUMMARY

PURPOSE OF THE REPORT

The purpose of this report is to provide the Ontario Waste Management Corporation (OWMC) with an analysis of the effect on tourism of hazardous waste management facilities in an area. This work was commissioned through the Institute of Environmental Research, Incorporated, (IER) who are studying the overall social and economic impacts of potential OWMC facilities. Tourism, and the potential impacts thereon, are considered to be a part of the broader social and economic impacts.

This report deals with case studies of currently existing tourism/waste management situations where historical data on tourism attendances can be studied in relation to the waste management facility or problem site. A companion report, Tourism Volumes and Potential Tourism Impacts, deals with tourism patterns and possible impacts in the vicinity of the candidate sites among which OWMC will choose in locating waste management facilities in future.

SCOPE AND METHOD

The approach to the study covered in this report involved two phases.

First, it was considered useful to analyze a situation that would be as comparable as possible to the situation where an OWMC facility might be operated in close proximity to a major tourist site located in an area of significant tourism visitation.

Second, it was considered desirable to examine the well-known case of the Love Canal in Niagara Falls, New York, to see if an impact on tourism could be detected as a result of the serious problems and the consequent high degree of media and public attention.

The resources available for the study permitted the consultant to visit the Niagara Falls area and one other case study area. Information beyond these two cases was to be collected insofar as was feasible within the resource limitations of the study.

The search for a case study waste management facility comparable to a future OWMC facility and located near a major tourism site was extended all over North America. The search

concentrated on facilities which operate incinerators, since their stacks are the most widely-visible features which tourists might recognize and conceivably be deterred by. A list of 696 sites in the U.S.A., provided by the U.S. Environmental Protection Agency, was considered initially, along with the Tricil site near Sarnia, Ontario, and one in West Germany. Criteria were devised to make the selected case as strong a test as possible for tourism impacts from the facility. The facility near Houston, Texas, operated by Rollins Environmental Services (Texas) Incorporated was finally selected, and was tested for its impacts on the nearby San Jacinto Battleground tourism complex, which receives over 1.5 million visitors per year.

The method of study involved visiting the waste management facility and the nearby tourist sites to obtain specific data on the operational history of the plant and on tourist site visitation over the relevant time period. Additional data were gathered on highway traffic counts in the area, and on historical visitation patterns to other major tourist attractions in the Houston region, from which the Lyndon B. Johnson Space Center, was selected as a control site. Interviews with the facility managers and senior staff were conducted to verify the data validity and to probe for their opinions on impact. In addition, a check was made of the newspaper coverage of the "key event" around which tourism impact might have occurred, in order to ascertain how prominent the coverage was. In this case, the key event was the commencement of incineration of PCB wastes at Rollins in large quantities in 1981. The case study facility was the first in the U.S.A. permitted by the E.P.A. to incinerate PCB's, and is still one of only three to do so.

The attendance data series were compared to determine whether the attendance changes at the nearby attractions differed from those at the control site.

The reasons for selecting Niagara Falls, New York, for a parallel study of tourism effects are obvious. There is no completely comparable combination of a major natural phenomenon such as the waterfalls and its proximity to such a large population base, anywhere in the world. The problems arising from the improper handling of the untreated hazardous wastes buried at the Love Canal has received such a volume of adverse worldwide publicity that it has become virtually synonymous with hazardous waste pollution.

The serious and widely-known pollution problem of Love Canal is very much more severe than any conditions that would be at all likely to arise from a well-engineered and properly operated industrial waste treatment facility such as that proposed by OWMC. It is hard to imagine how any environmental issue could have received more intensive, concerned or prolonged media attention than the Love Canal. The tourism situation is as close a parallel

to that of Niagara Falls, Ontario, as it is possible to obtain. For this reason, the case study of Love Canal is termed a "parallel study".

A time-series study was made of key tourism indicators in Niagara Falls, New York, from 1977 - just prior to the year when the Love Canal became widely known - to the present. Two analytical methods were employed. One involved the collection of data on actual attendances at those specific tourist attractions for which the most accurate and consistent counts are available. The second used traffic count data from key regional tourist highways which were analyzed to provide estimates of the patterns of overall tourist flows in the area. These were constructed by using the same method used to analyze tourist flows in the companion report noted earlier. The two series of data, one on specific site attendances, and the other on general tourism volume indicators for the area, were tracked over time and through the influence period.

In addition, personal interviews were conducted with key informants in the area, including the managers of major tourism facilities in the public sector and the convention managers of the major hotels in the private sector. They were asked for any additional information they felt would be relevant, and for their opinions on what the effect of Love Canal on tourism had been.

PREMISES AND POSTULATES

The premise underlying this study is that the OWMC will construct, on one or more of its candidate sites, facilities to manage industrial and hazardous wastes. Further, it is taken that the general size, nature and scope of the facilities will be as outlined in the report, Facilities Development Process, Phase 4A Report, OWMC 1985.

The postulate underlying the study of the comparable situation was that such a study could shed light on the question of whether or not a major waste management facility had a measurable or perceived effect on attendance at major tourism sites in its vicinity. A time-series comparison of visitation to nearby and more distant sites used as a control should show if any divergences occurred, and if so, in which direction.

The postulate underlying the study of the parallel situation of the Love Canal was simply that such severe problems and intensive media coverage of them provided an extremely adverse situation for nearby tourism - one in which maximum impact on tourism might be expected. If a high impact were to be found from the Love Canal, then a proportionately lesser amount of impact might be expected from the OWMC proposed facility. If little or

no impact were to be found, then none would result from a facility such as OWMC plans to build.

STATUS OF DATA

The data on attendance at tourist sites were all gathered by a personal visit from the consultant, who contacted the relevant facility manager or public information officer. Only attractions operated by public agencies, and for which lengthy and consistent time-series of accurate and reliable admission data are available, were included. Data on highway traffic volumes were obtained by contacting the state highway authorities in Texas and New York to obtain publicly available data. In the case of the New York State Department of Transportation, a personal visit to the Region 5 Planning Section in Buffalo was made to obtain detailed seasonal counts, 1983 data unpublished as of the study date, and to obtain verification of the appropriateness of the data and the choice of route sectors for the study.

With the above noted care in selecting sources of data, their basic validity were established and verified. The interpretation of the data and the attribution of cause-effect relations involved other factors such as weather conditions, economic factors, the energy situation, and unusual conditions such as construction affecting a facility temporarily. These are noted in the text.

MAIN FINDINGS

The waste management facility of Rollins Environmental Services (Texas) Incorporated has operated since 1971 on an 85 acre (34 ha) site in Deer Park, an industrial and residential suburb situated some 21 miles (34 km) east of downtown Houston. The facility received the first E.P.A. permit issued in the U.S.A. to treat PCB wastes; liquids in January 1981, and solids in March, 1983. Considerable prominence was given to the actual start of PCB incineration operations in March 1981 by local and regional media.

The Rollins facility is situated less than one mile (1.6 km) from the San Jacinto Battleground State Park. This 460 acre (184 ha) park is the site of the battle where Texas forces defeated the Mexican army in April, 1836, some six weeks after the Mexican victory at the Alamo. The park comprises five major tourism features in addition to the battlefield site and has the highest attendance of any State Park in Texas, averaging over 1.3 million visitors per year.

As a control site for attendance comparisons, the Lyndon B.

Johnson Space Centre, operated by the National Aeronautics and Space Administration (NASA), was chosen. This facility is a focal point for the U.S. manned space program, housing research and development, astronaut training, and the famous Mission Control Center so familiar to television space-watchers worldwide. The NASA facility is located about 22.5 miles (36 km) south-east of downtown Houston, or virtually the same distance as the San Jacinto site. Attendance at NASA has averaged just under 1.3 million visitors per year since 1978, prior to which it received fewer than one million annually.

Considering 1981 to be the "benchmark" year because of the major event of commencing PCB incineration at Rollins' waste management facility, we find that attendance at NASA and San Jacinto sites rose in that year over 1980. Since 1981, to 1983, NASA's attendance has declined by 18%; that at San Jacinto has declined by 8%.

The catastrophic environmental and health situation arising from hazardous wastes at the Love Canal site is widely known. The media attention to it became nationwide and even worldwide in August 1978, when the Governor of New York and the President of the United States declared a state of emergency. Further intensive coverage of progressively more severe problems continued through 1979 and into 1980.

The effect of Love Canal on tourism could be potentially evident in 1978, although the prime tourist season was about two-thirds over before media attention escalated in a major way in August of 1978. The 1979 tourist season should be the first full one to be potentially affected by Love Canal. The years 1980 and possibly 1981 should also, by the same logic, be affected because of the increasing severity of revelations about the pollution situation, coupled with continued widespread media attention.

The tourism situation in 1979 was complicated by the shortage of gasoline and the extremely sharp escalation of its price in the U.S.A. that year. Virtually all tourist indicators in the U.S.A. dropped that year, as they did also in 1982 in response to the economic recession.

Analysis of attendances at the Prospect Point Tower and the Earl Brydges Artpark was made over the period 1977 - 1983, because these data are the most precise and consistent available. Recreational traffic volumes on the Robert Moses Parkway were also analyzed in detail. Prospect Point is about 6.5 miles (10.7 km) from the Love Canal, and Artpark, about 7.8 miles (12.8 km). Comparing 1978 data with 1977 data, few conclusive changes can be found. Prospect Point Tower attendance increased 5%, while Robert Moses Parkway traffic was about level (calculated at 2% decline). Artpark increased 54%, no doubt reflecting developmental expansion following its opening in 1970.

Comparing 1979 with 1978, it would appear that Niagara Falls, N.Y. area tourism fell about 5%. This decline was registered at Artpark and on the Parkway, and compares favourably with the 8 - 10% decline experienced elsewhere in New York State that year. (The Prospect Point Tower declined 33%, but a major program to reconstruct its deck impaired amenity and impeded access during 1979.)

Data for the years 1980 through 1983 show a generally increasing trend over 1979, with some evidence of a slight dip in the recession of 1982. By 1983, tourism in the area had recovered from the gasoline crisis and recession to about 10% above the 1977 levels.

Data on convention activity in Niagara Falls, N.Y., show a significant annual growth through each of the study years, with the exception of 1982. In that recession year, the number of delegates declined although the number of conventions continued to grow.

Subjective information and opinions of all key informants interviewed did not yield any evidence of an actual effect on tourism from Love Canal.

CONCLUSIONS AND RECOMMENDATIONS

In the study of the possible effect of a waste management facility that is broadly comparable to OWMC's proposed facilities, no negative impact on attendance at a major tourism site only 1 mile (1.6 km) away and drawing over 1.3 million visitors per year could be detected.

In a study of the possible effect of the serious and widely-publicized hazardous waste situation at the Love Canal on tourism in the Niagara Falls, N.Y. area, no lasting negative impact on visitation can be substantiated.

From the objective and subjective data gathered, it cannot be concluded that the nearby presence of a waste management facility, or even a serious problem such as arose at the Love Canal from the improper handling of untreated hazardous wastes, has a negative impact on area tourism.

It is recommended that the Corporation consider further case studies in the event that it wishes a broader coverage of tourism impact situations from such causes as accidents at nuclear generating facilities, marine oil spills, nuclear facility siting, etc.

CHAPTER 1

INTRODUCTION

1.1 PURPOSE AND SCOPE OF THE REPORT

This report was commissioned by the Ontario Waste Management Corporation (OWMC) through the Institute of Environmental Research, Incorporated (IER). IER has been engaged by OWMC to assess the social and economic impacts of construction of facilities to process hazardous wastes at one or more of the candidate sites being considered by OWMC. These sites, the process of their selection, and the nature of the facilities that might be constructed on them are described in the report, Facilities Development Process, Phase 4A Report, 1985.

Since tourism is both a social and an economic phenomenon, the Corporation desired to have, as a part of its program to assess social and economic impacts, a study of tourism impacts that have occurred in other situations where hazardous waste management facilities operate near major tourist attractions, or where hazardous waste itself has been an environmental problem in a major tourist destination area. This study was seen as part of the Corporation's program to predict the nature and magnitude of impacts that its proposed facility might have on tourism in the area of Niagara Falls, Ontario. Two of the eight candidate sites (LF-1E and PI-27E) are located within the City of Niagara Falls.

A companion report, Tourism Volumes and Potential Tourism Impacts, deals with the more localized tourism patterns and possible impacts in the vicinity of all eight candidate sites.

This study was specifically designed to identify situations where facilities to manage hazardous wastes have operated in recent years in or near major tourist focal points. Historical data were to be examined to determine whether or not tourism actually was affected when the nearby waste management facilities were opened, or when their operation was extended in a major way.

In selecting cases to study, the unique features of Niagara Falls tourism were borne in mind. Some of the main features are:

- there is a major natural feature which serves as a focus for a wide range of man-made attractions

- within a short driving time along the Niagara River there is an additional set of natural and man-made attractions

- there is a large population within the nearby market area; approximately 7 million people live within a two-hour drive from Niagara Falls.

In the final analysis, it was decided that a two part study would offer the most definitive results. The first portion of the study was to cover a waste management/tourism situation that was as comparable as possible to the OWMC/Niagara Falls situation, as outlined above. The second portion of the study was to examine a situation which is widely acknowledged as the worst case of hazardous waste pollution - one in which the environmental and health problems from the hazardous waste are very much worse than any that would be at all likely to arise from an OWMC facility - but one in which the tourism situation is almost exactly analogous to that of Niagara Falls, Ontario. This case, of course, is that of the Love Canal hazardous waste dump in Niagara Falls, New York. Since the case is comparable only on the tourism side of the equation - and in this respect it is the most comparable that could possibly be found - but it is not at all comparable on the waste management side - since the Love Canal was a mismanaged site for the dumping of raw, untreated hazardous wastes - the second study is termed a parallel study.

These two portions of this study provide answers to the questions:

- has there been any effect on tourist visitation to major tourism sites located near a major facility that treats and manages hazardous wastes?

- has tourist visitation in Niagara Falls, New York, been affected by the presence of the Love Canal waste site and the world-wide publicity it has received?

1.2 ARRANGEMENT OF THE REPORT

Chapter 2 presents the analysis of the comparable situation. It describes how the case was selected from among nearly 700 possibilities. The background of the waste management facility is outlined, along with the objective and subjective public reactions to it. The nature and background of the nearby tourism site is then provided, showing the diverse nature of the complex and its role in the overall area. The historical data on attendance are then analyzed, using as a control another area attraction of comparable magnitude but not located near the waste management facility.

Chapter 3 presents the analysis of the parallel situation. A brief overview of the Love Canal problems and their timing is presented. Then, various indicator data are used to trace what the attendance and tourism fluctuations actually have been from the period prior to the discovery of the problems at Love Canal to the present.

Chapter 4 summarizes the conclusions of the studies; that there is no negative impact on tourism in the comparable situation, and that no lasting negative impact on visitation can be substantiated in the parallel situation.

CHAPTER 2

COMPARABLE STUDY: A MAJOR HAZARDOUS WASTE MANAGEMENT FACILITY NEAR MAJOR TOURIST ATTRACTIONS

2.1 SELECTION OF THE CASE

In searching for suitable case studies that would be as comparable as possible to the situation of an OWMC waste management facility in Niagara Falls, the main criteria were:

- the waste management facility should be as comparable in size and scope to the "fully integrated" facility outlined in the OWMC Phase 4A Report on the Facilities Development Process, 1985, and
- the tourist facilities should be major attractors, preferably with over a million visitors annually and located in a general area attracting many millions of visitors.

Waste management facilities located anywhere in North America were considered in the initial search. The above criteria were used to provide the initial screening of candidate cases, which narrowed the list considerably, as is outlined below. Also, one waste management facility in West Germany was given initial consideration, since it is known to be located adjacent to a public amusement park. The attendance at this park was, however, well under one million annually, and the case was not pursued further.

In addition to the general criteria stated above for focussing the initial search for a comparable waste management facility, the following additional criteria were adopted:

- the waste management facility should include a major incinerator, since an incinerator and its stack are the most visible items to tourists passing by near a facility, and are the most evident source of environmental emissions, whether hazardous or not,
- the waste management facilities should be sized as comparably as possible to those proposed by OWMC, both in terms of waste treatment capacity and in site size,

- the hazardous wastes should be treated on a "utility" or contract basis; that is, not as an in-house facility of a single corporation or industrial plant, so that the pattern of tanker truck traffic near the facility would be more similar to that of the proposed OWMC waste management plant than that of a stand-alone or in-house facility,

- the more hazardous the range of wastes handled by the facility, the stronger the tests of its effects on tourism would be,

- the facilities should have been established, or have undergone a major expansion or operational change within the past several years, in order to provide a clear "key event" year from which any changes in tourism could be studied,

- the facilities should be located as close as possible to one or more major tourist sites, with closer distances providing the more severe test,

- the facilities should be located in as unambiguous a manner as possible with respect to the access corridor to the tourist sites, in order to make any effects as obvious as possible; in this respect, a waste management facility located adjacent to the sole means of access to an otherwise isolated tourist site would represent conceptually the most stringent test,

- data on attendance should be available, reliable, and should cover sufficient years before and after the opening or expansion of the waste management facilities to make trends show clearly,

- there should be some other tourist facilities in the same general market area to serve as a control for comparison purposes. A control site should be as remote as possible from the case study site, so that it can thereby be presumed to be as free as possible from the influence of the waste management facility.

The United States Environmental Protection Agency has compiled a list of 696 sites in the U.S.A. where a hazardous waste incinerator is or has been operated or is believed to operate. The Tricil site near Sarnia was also considered, but is not near a major tourism site. Initially, this list was examined to exclude sites where the incinerator was not actually being operated; where the corporate name indicated it was probably not a contractor; and where there was known to be little or no tourism volume in the general site area. Some 72 sites remained after this initial

exclusion round, and their locations were checked on maps to ascertain what specific tourism sites existed nearby.

After this stage, some six sites in six different states - Louisiana, Massachussets, New Jersey, Pennsylvania, Rhode Island and Texas - remained under consideration. Telephone calls were made to EPA officials in Washington and in regional offices to elicit further suggestions and information on sites. The sites in Louisiana and Massachussets are located in near-urban industrial areas, relatively remote from their state's tourism areas. The sites in Pennsylvania and New Jersey are located in relatively rural areas, in the order of 40 km from some medium-level tourist attractions, but are not located on corridors that tourists would normally use to reach the tourist areas. The Rhode Island site is also not far from tourist areas since the state is so small in area, but the tourism pattern in Rhode Island focusses on the coastal zone in general, and not on specific sites for which measurements are likely to be readily available. The Texas site, however, fulfilled all of the criteria to a highly satisfactory degree.

Accordingly, the site of Rollins Environmental Services (Texas) Incorporated, in Deer Park, Texas, was finally selected as best fulfilling the stated criteria. Telephone calls were placed to the company to arrange an on-site visit, and to nearby tourist attractions to arrange visits and to confirm the general scale of their attendance. A two-day study visit to the Houston area to gather information and assess the tourism situation was made on July 24-25, 1984, by the principal consultant.

2.2 BACKGROUND ON THE WASTE MANAGEMENT FACILITY

The waste management facility of Rollins Environmental Services (Texas) Incorporated has been operated since 1971 in Deer Park, an industrial and residential suburb located some 21 miles (34 km) east of downtown Houston. Houston is a major centre for petro-chemical production and export, and its industries generate considerable quantities of hazardous wastes. Rollins operates three other hazardous waste management facilities in the U.S.A.: at Bridgeport, New Jersey; Baton Rouge, Louisiana; and Plaquemine, Louisiana. It operates its own fleet of collection trucks that operate nation-wide, offering pickup of wastes and "turn-key" treatment certified to its customers. Explosive or radioactive wastes are not accepted by Rollins. Their site near Baton Rouge disposes of some wastes by controlled deep well injection to nearly a mile (1 500 m) underground. Baton Rouge and Deer Park offer chemical, physical and biological treatment of wastes, as well as engineered landfills that can receive drummed and bulk solids or pretreated wastes - not liquid wastes.

Rollins operates hazardous waste incinerators at two of its other locations, but the one at Deer Park has the capability of handling PCB's (polychlorinated biphenyls), an extremely hazardous substance which has received considerable attention from the media in recent years. Its manufacture has been prohibited since 1976. In January 1981, this facility was the first in the U.S.A. to receive a permit to incinerate liquid PCB wastes. In March 1983, the permit was extended to cover solid PCB wastes. To the present date, only two other facilities in the U.S.A. have been permitted to burn PCB's. The process, technical details of which are given in Gregory (1981), involves a rotary-kiln incinerator with auxiliary fuel feed, an afterburner and emission scrubber stages. By law, PCB wastes must be 99.9999% destroyed, and no PCB's are allowed in stack or scrubber effluent. The incinerator is continuously monitored by automatic equipment which instantly shuts the unit down if any one of several parameters are exceeded. In addition, an EPA approved engineering firm inspects the facility during unannounced visits several times each month.

From a level of about 60 employees in 1977, the facility has grown to employ 170 persons in total. The incinerator operates on a 24-hour per day basis. Landfilling operations and physical-chemical-biological treatment work on a single shift. While data on the total volume of waste treated are considered proprietary information by the company, some 90% of the wastes incinerated at Deer Park are said to be PCB wastes. Most non-PCB wastes from Rollins' Houston area customers are transported to Louisiana for incineration, in order to free the Deer Park facility for its special PCB-handling capability.

The site of the waste management facility is 85 acres (34 ha) in area. Some 30 acres (12 ha) are used for the engineered landfill. The incinerator stack is about 99 feet (30 m) in height. During 1979 and 1980, test burns of PCB's were made to provide technical data and information for a study of the possible effects of the operation on human health.

The report of the health study issued by the EPA (the full reference is given in the Bibliography) concluded that the risk of an individual incurring cancer as a result of the Rollins PCB incineration operations was 0.000018; that is, just under one increased case of cancer could be expected to occur per 50,000 persons exposed. (There is a maximum of 25,000 persons in the area the EPA considered to be exposed, including in-commuting workers.) The study presumed several "worst case" assumptions, including that an exposed person would be breathing the maximum concentration from the effluent plume, and that this would occur continually for 70 years. The report concluded that "...the lowest dosage producing a health effect is seen to be 15,000 times higher than the highest dose predicted at Rollins. This is strong evidence that the health effects addressed would not result..."

Despite the findings of the health study, there was considerable public opposition to the granting of the PCB permit in 1981. The Deer Park Town Council and the local member of the Texas Legislature adopted official positions opposing the permit. The EPA held a major public meeting which was attended by all actors and the public. Considerable media attention was devoted to the issue by Houston television stations, the Houston Post, the Houston Chronicle, the Pasadena Citizen (a daily newspaper serving Houston's eastern suburbs), and the Deer Park Progress (weekly). For example, of the 50 issues of the Pasadena Citizen leading up to the actual start of PCB burning on March 9, 1981, thirteen issues covered the Rollins story. Of these, twelve featured front-page coverage, including three where the story was given the banner headline. On the start-up day, some 60 persons picketed the entrance to the Rollins facility. The next day, front-page photos and TV coverage appeared showing mothers and children carrying anti-PCB signs.

Certainly, the awareness of the new status of the Rollins facility in the Houston metropolitan area must have been quite high, particularly in the eastern suburbs. Some other Texas media are believed to have covered the story, but nation-wide awareness was probably limited to those who follow environmental issues and EPA actions quite closely through specialist media. Since the early part of 1981, media attention to Rollins has largely subsided. No further picketing or public demonstrations have occurred. A few months after the initiation of PCB incineration, the Houston affiliate of the Public Broadcasting Service carried an informative and positive television documentary on hazardous waste management, citing Rollins as a growing Houston company based on the efficient and proper handling of such wastes.

The location of the Rollins site is such that the nearest built-up residential area is about 3 miles (5 km) away, upwind of the site under prevailing wind directions. The site is situated on State Route 134, about 2 miles (3 km) north of State Route 225.

The waste management facilities and landfill area are set back about 600 feet (185 m) from the roadway, with the intervening area being occupied by tank-trucking and truck leasing operations of various Rollins-affiliated companies.

The land use on areas to the north of S.R. 225 as one approaches S.R. 134, and on both sides of S.R. 134 approaching the Rollins site, is largely industrial. Major oil companies and petrochemical companies operate there on large open sites, characterized by tank farms, refineries and warehouses. To the northwest of Rollins, there are large grain terminals on the Houston Ship Channel, about 1 mile (1.6 km) distant. To the northeast of Rollins, there is a major tourist complex, focussed on the San Jacinto Battleground State Park, described more fully in the next section.

S.R. 134 continues for about 1 1/2 miles (2.4 km) past the Rollins site, where it ends at a ferry crossing of the Houston Ship Channel. Just west of the ferry crossing, the Ship Channel meets the head of San Jacinto Bay. The only means of road access to Rollins is via S.R. 134. The only means of access to the San Jacinto tourist sites is S.R. 134 and the ferry. Therefore, the spatial relationship between the waste management site and the tourist sites is not only a close one, it is very unambiguous. Most tourists will drive directly past Rollins twice on S.R. 134 in visiting the San Jacinto sites. Most of the remainder use the ferry once and pass Rollins once. Very few come and go both ways by the ferry.

Figure 1 (next page) shows the spatial relationships.

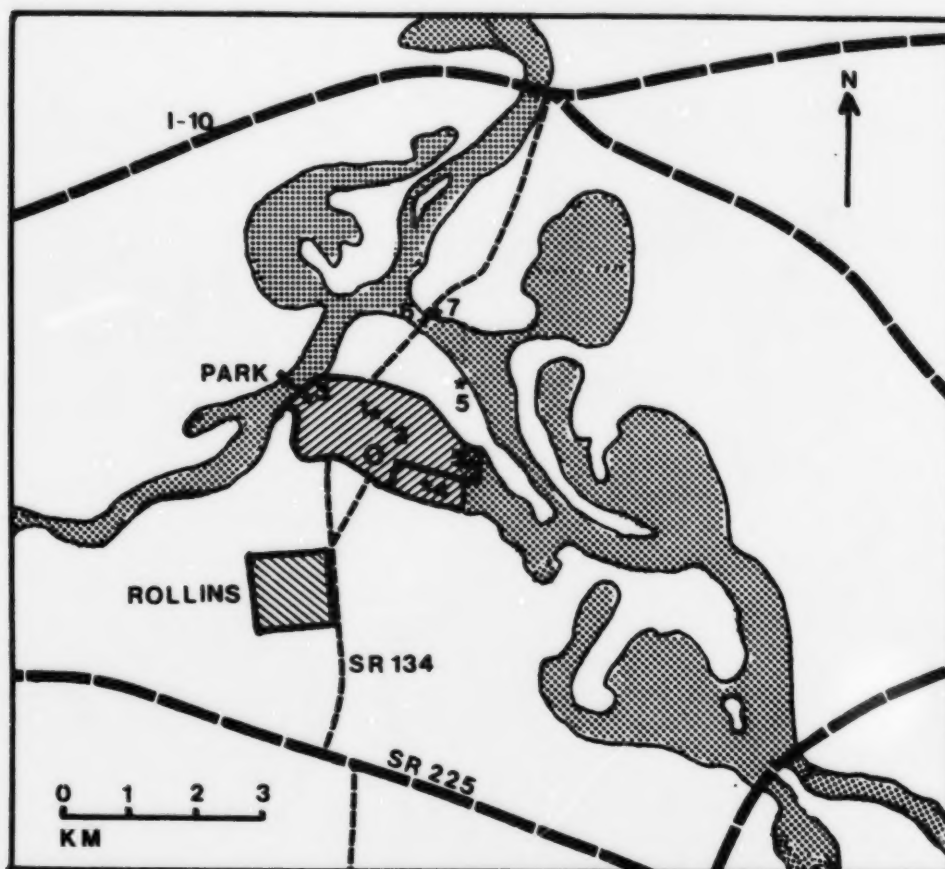
2.3 BACKGROUND ON THE TOURISM ATTRACTIONS

Just under a mile (1.6 km) from the hazardous waste management facility operated by Rollins Environmental Services (Texas) Incorporated, lies an array of tourism attractions focussed on and around what is arguably the most celebrated historic site in Texas - the San Jacinto Battleground. The juncture of the Houston Ship Channel, flowing north-east, and the San Jacinto River, flowing south-east, forms a broad peninsula served only by State Road 134 (Battleground Road) and a small vehicle ferry which connects to the small community of Lynchburg on the north side of the Ship Channel.

In order to assist Canadian readers of this report in assessing the significance of the tourist sites in the area, and their attraction to the Texan, American and Mexican tourist markets, the following paragraphs present an outline of the historical events which focus strong visitor interest on the San Jacinto area.

The high regard which all Texans and, indeed, most residents of the south-western United States, hold for the San Jacinto Battleground arises from the momentous nature of the battle which took place there on April 21, 1836. This battle was a victory which avenged the infamous defeat at the Alamo and brought about an independent Republic of Texas. It must be remembered that the area which now comprises the States of Texas, New Mexico, Arizona, California, Nevada and Utah - and parts of Colorado, Wyoming, Kansas and Oklahoma - had been a Spanish possession since early in the sixteenth century. The independence of Mexico, whose territory included what is now Texas and the other south-western states, was achieved only in 1821 after an armed revolution led by Hidalgo. During the 1820's, the previously almost unpopulated area of Texas was colonized by English and American citizens under

FIGURE 1.
ORIENTATION MAP OF ROLLINS/SAN JACINTO AREA



LOCATIONS:

- | | |
|-----------------------|--------------------|
| 0 = Battleground | 4. Nature Reserve |
| 1. Museum | 5. Picnic, Fishing |
| 2. Monument | 6. Ferry |
| 3. Battleship "Texas" | 7. Lynchburg |

Stephen Austin and others. The relatively loose federal system of Mexican rule was generally acceptable to these new Texans. In 1830, however, the heretofore indifferent Mexican government decreed an end to Anglo-American immigration and clamped down administratively on the territory. Texas residents were aroused to armed rebellion and raised a volunteer army in 1835. This army had initial success against the light Mexican forces then in place. In early 1836, however, a larger Mexican army under the personal command of Mexico's dictator-president, General Santa Anna, re-entered Texas. His forces captured San Antonio and laid seige to the Alamo. In early March of 1836, the Texan garrison at the Alamo was wiped out to the last man, including such popular heroes as Davy Crockett and James Bowie.

The confident Santa Anna pursued Texan forces far and wide, gaining other successes and nearly capturing the rebel President of Texas. He finally met his match when Texas fighters led by General Sam Houston engaged him in a brief but extremely bloody battle on a peninsula formed by the San Jacinto River. Santa Anna was captured and held hostage until all Mexican forces withdrew south of the Rio Grande, and the formation of the Republic of Texas was declared. As events unfolded, Texas joined the United States of America just 10 years later in 1846, though its strong independent heritage won it unique terms of union. Texas retained ownership of its entire public domain and obtained the right to divide itself into as many as five states.

The broad peninsula containing the San Jacinto Battleground comprises a 460 acre (184 ha) State Park. It is complemented by a narrow curved outer island separated by a fairly narrow channel from the park. The outer island is relatively undeveloped, except for two well-known restaurants whose dining rooms overlook the Houston Ship Channel and its active and diverse shipping traffic. The San Jacinto Battleground State Park encompasses the following major attractors:

- the San Jacinto Battleground itself,
- the San Jacinto Monument and Museum of History,
- the de-commissioned battleship, the U.S.S. Texas,
- a nature reserve,
- extensive areas for picnicing, passive recreation, fishing from the riverbanks, and viewing shipping in the Ship Channel.

The San Jacinto Monument was constructed in 1938 and, at the time, was the tallest masonry and concrete structure in the world. An elevator gives access to a viewing gallery atop the monument, and the base of the structure houses an extensive

historical museum and library, operated by a non-profit museum association. The 570-foot (175 m) height of the monument allows a wide-ranging view over the Houston area and the nearby Galveston Bay. Each portion of the viewing gallery is equipped with coin-operated binoculars and a plaque identifying features visible from that sector. The plaque on the sectors facing inland (south and east) identify Rollins by name, along with seven other industrial neighbours. The waste management facilities, including the incinerator stack, can be clearly seen even without binoculars.

The U.S.S. Texas is one of the few battleships in the world to have served in both World Wars. Commissioned in May 1915, she fought in the Atlantic in World War I. After being modernized and updated between the wars, she fought off North Africa and Normandy, covering the D-Day Invasion. In 1945, she was engaged at Iwo Jima and Okinawa. Upon her de-commissioning in 1948, she was not dismantled but instead was turned over to a Battleship Texas Commission. This body operated the ship as a floating museum, developing many specialized exhibits within it such as the Admiral Nimitz Room and the Texas Navy Museum, as well as offering public access and tours of the ship's spaces. Within the past year, the Battleship Texas Commission has turned the operation of the ship over to the Texas Parks and Wildlife Department, which operates the rest of the San Jacinto Battleground State Park.

The nature reserve portion of the San Jacinto site is a broad strip bordering the property of the Diamond Shamrock Chemical Company, which in turn is located directly across the road from Rollins. Active visitation to the reserve is discouraged to avoid disturbance to the pelicans, Louisiana and great herons, roseate spoonbills and other sensitive wild birds which inhabit the reserve. It is also discouraged to avoid visitor contact with the poisonous snakes and coyotes in the reserve. Nevertheless, the visitor often sees large quantities of birds in the waters bordering the park, many of which depend on the reserve for their nesting areas.

2.4 GENERAL TOURISM MARKET AND SELECTION OF CONTROL SITE

Total visitation to the San Jacinto Battleground State Park is substantial, at over 1.3 million visitors annually for the past several years. San Jacinto is the most-attended State Park in Texas, by a considerable margin. Total visitation in the Texas State Park system was 17 006 006 in 1982, which shows that San Jacinto alone attracted over 12% of the system's total attendance. Before considering the San Jacinto tourism data in detail, some background information on tourism in the Houston area is in order. This background will provide the rationale for the choice of a tourist site to use as a control on the attendance

patterns at San Jacinto before, during and after the "key event" of the commencement of incineration of PCB's in early 1981.

Measured by the number of out-of-state visitors received annually, Texas ranks third behind California and Florida as the most-visited state in the Union. In 1982, some 35 400 000 out-of-state tourists visited Texas, spending some \$12.5 billion. The Houston area - Harris County - receives about 8.5 million of these out-of-state visitors, in addition to several million visitors from other parts of Texas, for which an exact estimate is not available. Some 23% of the visitors to Texas are on business trips; the remainder are on vacation, pleasure or personal trips.

The Houston/Harris County area has a population of 2.4 million and offers a wide diversity of tourist attractors. Some twenty individual listings appear under "What to See" in the 1984 edition of the Texas Tour Book, published by the American Automobile Association. Five of these, including the San Jacinto site, have a "diamond" rating, denoting an attraction of exceptional interest and quality.

The listed "diamond" attractions are:

- the Houston Astrodome; about 7 miles (11 km) from downtown, offering professional sports, rodeos, exhibitions and visitor tours.
- Astroworld; opposite the Astrodome, a 75-acre themed amusement park with about 100 rides, many other attractions and shows. Its annual attendance is in the 2 million range, but exact current or historical figures are not given out.
- Bayou Bend; about 3 miles (5 km) from downtown, a large, stately historical home, but with fairly small attendance volumes.
- the Lyndon B. Johnson Space Center; about 22.5 miles (36 km) southeast of downtown, operated by the National Aeronautical and Space Agency (NASA) and serving an average of about 1.3 million visitors annually over the last few years.
- the San Jacinto Battleground sites; about 21 miles (34 km) east of downtown, also in the 1.3 million annual attendance range.

Of the above attractions, the LBJ Space Center clearly offers the best potential as a control site against which to compare attendance patterns with the San Jacinto sites. They have comparable volumes of total attendance; both are located on the outer limits of the urbanized area; both are at comparable

distances from downtown Houston. While not located in completely opposite directions from downtown, their separation is emphasized by the configuration of the freeway system, with only the initial 5 miles (8 km) of the routes from downtown to each site being along the same segment of Interstate 45. Both are operated by public sector agencies, and attendance figures are available. The officials of both agencies are also willing to explain their data collection procedures, and to point out where these have changed in past years in such a manner that the time series of data can no longer be compared.

The Space Center was established in the 1960's to serve as the focus for the U.S. manned space-flight program. In addition to housing the astronaut training facilities, it serves as the major facility for space research and development efforts. All manned space flights are controlled from the Mission Control Center, which has become familiar to millions of television viewers world-wide. Displays of spacecraft, actual rockets, lunar vehicles, moon rocks and numerous other space artifacts attract the visitor. Both guided and self-guided visits to several buildings can be made, including Mission Control.

Admission to both the San Jacinto Battleground and the LBJ Space Center is free of charge. At the Battleground, nominal charges apply to tours of the Battleship Texas and to the elevator ride in the Monument. At the LBJ Center, admission to some of the specialized portions such as Mission Control and astronaut training sessions is by reserved ticket only, which are often available in numbers much fewer than the demand.

2.5 TOURISM DATA AND ANALYSIS OF EFFECTS

Reliable and consistent time-series data are available for the overall annual attendance at the LBJ Space Center and the San Jacinto Battleground State Park for several years prior to 1981, the key event year chosen for this comparative study. In 1976, several changes were made to the access road configuration and parking arrangements at the Battleground as part of their U.S. Bicentennial project. These were completed in 1977 and the method of counting attendance was changed accordingly. Therefore, attendance data for years prior to 1978 are not comparable to current data, and are not presented in this report.

Within the San Jacinto site, the monument and museum attract close to 400 000 annual visitors. There is free admission to the museum exhibits, but \$1.50 is charged for the elevator to the top of the monument. The Battleship Texas recently has averaged 185-200 000 paid visitors per year, but in 1984 the attendance increased to about 250 000, which was felt to be the result of reducing the adult entry fee from \$3 to \$2 under the new

administration by the State Park.

Table 1, following, presents the total attendance numbers for the LBJ Space Center and the San Jacinto Battleground State Park from 1978 through 1983. The Space Center figures are on a calendar-year basis. Those for the State Park are on a fiscal-year basis, running from September of the previous year to the end of August of the year noted. An index, based on 1981 = 100, is also presented, in order to facilitate comparisons with the key event year when the major change in the operation of the Rollins hazardous waste management facility occurred; namely, the commencement of incineration of PCB wastes, with the consequent media attention.

TABLE 1

ANNUAL ATTENDANCE COMPARISON - LBJ SPACE CENTER AND
SAN JACINTO BATTLEGROUND STATE PARK

<u>Year*</u>	<u>LBJ Space Center</u>		<u>San Jacinto Battleground</u>	
	<u>Attendance</u>	<u>Index</u>	<u>Attendance</u>	<u>Index</u>
1983	1 201 694	82.3	1 321 264	91.8
1982	1 297 045	88.8	1 360 000	94.5
1981	1 460 185	100	1 439 024	100
1980	1 162 016	79.6	1 391 304	96.4
1979	1 376 029	94.2	1 109 134	77.1
1978	1 097 012	75.1	1 135 384	78.9

* Calendar year for LBJ Space Center;
fiscal year (Sept. 1-Aug. 31) for San Jacinto State Park.

Sources: San Jacinto Battleground, Park Superintendent.
LBJ Space Center, Information Officer.

It is appropriate to note that two major factors have influenced tourist travel in the U.S.A. over the 1978-1983 period. In 1979, there was a rapid rise in energy costs as a

result of the problems in Iran. Many gasoline stations operated on reduced hours or on a quota system. Long-range automobile travel, in particular, experienced severe declines in many parts of the country. Texas was one of the less-affected areas, however. In 1982, and persisting into 1983, effects of the economic recession were noted. Both business and pleasure travel indicators declined.

When we examine the attendance data in Table 1, we note that both attractions had roughly similar attendance volumes and patterns of annual variation. By 1983, each had risen in visitation by 20-25% over 1978. Attendance at both attractions declined between 1981 and 1983, as might be expected from economic conditions. It must be noted that the decline at the Space Center over that period was actually much greater, both in absolute numbers and as a percentage, than at the San Jacinto site. That is, the Space Center's attendance dropped by 258 491, or almost 18% of their 1981 total. The San Jacinto site's visitation declined by 117 760, representing just over 8% of its 1981 total, or only 46% as much loss as the Space Center experienced.

As corroborating information, highway traffic data were supplied by the Texas State Department of Highways and Public Transportation. These data show no decline in traffic from 1981 to 1983 on Battleground Road (S.R. 134) measured just south of the entrance to the State Park. Their count for the portion of Battleground Road measured just north of S.R. 255 - and therefore reflecting the truck and worker traffic to the industries on S.R. 134 - show the expected drop in 1982 and partial recovery in 1983 that economic trends would suggest.

Personal interviews with the Superintendent of the State Park, the Captain of the Battleship Texas, and other employees of the park/museum complex yielded the opinion that the Rollins facility has no influence on their attendance. There is said to be the occasional presence of odours on the site, described as "crude oil smells", but this is attributed to the major petroleum-based industries nearby along the Ship Channel. No informant attributed odours specifically to Rollins.

Considering all of the objective data, and supported by the subjective personal impressions of the key informants, it is not possible to support any contention that the operation or the change in operation to a PCB incineration facility of the Rollins waste management facility has had an effect on attendance at the nearby major tourism sites. Indeed, the potentially-affected San Jacinto locations can be seen to have weathered the 1981-1983 recession period rather better than the LBJ Space Center which served as the control site, relatively remote from the waste management facility.

CHAPTER 3

PARALLEL STUDY: THE LOVE CANAL SITUATION VERSUS TOURISM

IN NIAGARA FALLS, NEW YORK

3.1 INTRODUCTION TO THE CASE

In recent years, the Love Canal has become virtually synonymous in the public mind with hazardous industrial waste problems. By any standards, the situation is a major environmental problem and it has led to intense and prolonged publicity and media attention. It would be hard to identify a major tourist location in the world which has received more attention to an environmental problem within its area and, certainly, there is none which has received more adverse exposure resulting from a hazardous waste issue.

While the Love Canal is, by a considerable margin, the most widely-known hazardous waste site in the Niagara Falls, N.Y., area it is by no means alone. Some 215 hazardous waste disposal sites are known to exist in Niagara and Erie counties. Five - including the Love Canal - are considered to be such serious hazards that they are designated for priority remedial action by the New York State Superfund Management Board. Love Canal contains about 21 800 tons of chemical company wastes, but the 102nd Street landfill site located between Love Canal and the Niagara River - bordering the river and extending beyond its natural shoreline - contains an estimated 159 000 tons of wastes, deposited by two chemical companies.

Since the basics of the Love Canal situation are well known, and the details of the problem (see Bibliography) are familiar to most waste management specialists, only an outline of the case will be given here. The emphasis will be on the chronology, so as to identify the period after which any effect on area tourism might be sought.

The Love Canal site contains an excavation some 3 200 foot (985 m) long and 225 foot (69 m) wide in the east end of Niagara Falls, New York. It was excavated from clay soils in the 1890's to provide a channel for a direct-current hydroelectric station which eventually was never built. The "canal" was never connected to the Niagara River, but it did accumulate some water, and served as a rural swimming hole into the 1930's. The site was acquired by

the local Hooker Chemical and Plastics Corporation, which landfilled chemical wastes there from about 1942 to 1953, after which the chemicals were covered with a clay cap and the site was closed. The site area was deeded to the local School Board by Hooker for \$1 in 1953, at which time a warning about the potential for injury or death from the wastes was included in the conveyance document. Some sources (cited by Zausse, 1981) allege that the School Board exerted considerable pressure on Hooker to obtain this inexpensive site. During the 1950's, a public school was erected partly over the canal itself, very close to the wastes. Two streets were extended across the site; storm and sanitary sewers were punched through the canal walls and through the chemical wastes, connecting to sewer systems throughout the area. Much of the clay cap was disturbed in landscaping the on-site school yard and some apparently was removed to landscape another nearby school site. Housing grew up all around the area, including two long rows of houses constructed on lots averaging 60 x 150 feet (18 x 46 m) backing directly onto what was once the canal site.

No widespread problems were recorded until the 1970's. A would-be developer of 50 or so houses to whom the School Board had sold the southerly portion of the canal itself in 1960, was ordered in 1972 by the city to correct chemical odours and potentially hazardous conditions. He never got his building permits, and sold the site in 1970. In 1976, record rainfall in the Niagara Falls area occurred, and is presumed to have entered the dumpsite, forcing quantities of chemicals up and out of the waste cells. In October of that year, the first reports circulated locally that nearby basements were being infiltrated by chemical wastes.

The New York State Department of Environmental Conservation (DEC) sampled basement sumps and local sewers for Mirex and PCB's in late 1976. The City of Niagara Falls, at DEC's urging, hired a consultant in 1977 to conduct an environmental analysis. Late that year, DEC asked for EPA assistance in expanding the study of groundwater pollution and air sampling in basements. Early in 1978, test results were released confirming the presence of chemical contamination in sumps and basement air. In April 1978, the State Commission of Health became involved, touring the site and issuing orders for cleanup of visible chemicals. Access to the site was restricted, and medical studies were initiated. During the period from May to July of 1978, increasingly serious results of pollution tests and toxicological/epidemiological studies were released. On August 2, 1978, the State Health Commissioner declared a state of emergency to exist at Love Canal, and public media attention broadened from the regional and state level to nationwide.

The Commissioner's declaration referred to the first two rings of houses near the site, some 239 homes constructed on both

sides of 97th and 99th Streets. It recommended relocation of pregnant women and children under two years of age from this area, and closed the 99th Street Public School. On August 7, 1978, President Carter declared a Federal Emergency under Public Law 93-228. By doing so, he enabled Federal funding and more stringent actions to be taken, and nationwide attention greatly increased.

During the remainder of 1978, through all of 1979 and into May 1980, results of a massive array of tests and studies flowed to the media with considerable frequency and regularity. Remedial actions commenced, and cost estimates of the impact climbed. From the initial 239 families, medical studies were expanded to about 700 households. Blood from some 3,919 area residents was tested for abnormal liver function. Disturbing results of studies of chromosome damage, birth defects, stillbirths and spontaneous abortions were received.

On May 20, 1980, two officials of the EPA were held hostage for several hours by angry homeowners demanding a hearing with the President about their plight and demanding that they be immediately evacuated from the area. This action struck a responsive chord in the media at the time, owing to President Carter's election-year problems regarding American hostages in Iran. On May 22nd, the President did, indeed, declare a second Federal Emergency at Love Canal. The boundaries of this second declaration area were much broader. Encompassing an area roughly 1.0 x 1.5 km, it closed another school, a firehall, community centre, churches and affected about 700 homes.

The actions of 1980 were accompanied by extensive media coverage. Some of this was, of course, desired in that election year by the political personages involved. The Governor of New York ceremonially signed new legislation at Niagara Falls City Hall in June, creating a Love Canal Revitalization Agency. The Governor and the President jointly and ceremoniously signed a funding agreement for this agency on October 2, 1980, also in Niagara Falls.

The horrors of the Love Canal and the poignant public concern about the potential of hazardous industrial wastes to cause chromosome damage, carcinogenic and mutagenic effects, among others, led to support for national legislation. On November 19, 1980, the Resource Conservation and Recovery Act took effect, introducing a "cradle to grave" concept for control of toxic wastes. On December 12th, the out-going President Carter signed the Superfund Legislation, creating a \$1.6 billion fund to clean up chemical spills and hazardous waste dumps.

Other jurisdictions took note of the potential "environmental time bomb" posed by hazardous waste dumps, as symbolized by the Love Canal. Public concern about hazardous wastes aroused by the Love Canal publicity was translated into governmental actions in

many other states and provinces. For example, in 1979 the Ontario Ministry of the Environment commissioned teams of university researchers to search out and initially survey waste dumps in Ontario that had been used and abandoned prior to 1971, when waste disposal site licencing began. The primary concern was to discover whether there might be any "Love Canal situations" in Ontario. (None were found.)

To summarize the chronology of the Love Canal discoveries, and public attention thereto, for their possible effect on tourism in Niagara Falls, we must consider 1978 as the earliest possible starting point. Local and regional coverage occurred early in that year, and nation-wide attention grew after the emergency declaration in August, 1978 - quite late in the main tourist season. Throughout 1979, the coverage of serious problems persisted and Love Canal became synonymous with hazardous waste problems. The 1980 discoveries and second presidential emergency declaration perpetuated the wide media attention. By 1981 and 1982, remedial action was well underway and attention subsided somewhat. Into 1983 and 1984, the Love Canal area began to resemble a ghost town. The 99th Street School was boarded shut and the inner rings of homes fenced off. Most other homes were vacated, and presently remain abandoned. The only traffic in the area is to one of the very few residences whose occupants have refused to move - including two in the "inner ring" - agency or contractor's vehicles, and the occasional curious tourist.

The Love Canal site is located about 2.5 km from the nearest tourist area, a secondary "motel strip" containing no other tourist attractions, along Buffalo Avenue just east of the I-190 Grand Island Bridge. It is about 10 km via the Robert Moses Parkway to the Falls themselves and the Rainbow Bridge area; it is about 13 km via I-190 to the Lewiston Bridge area and the Artpark. Despite this physical separation and the site's relatively out-of-the-way location in the city, the world and presumably the average tourist, knows that Love Canal is in Niagara Falls, New York. The average tourist may or may not be aware that over 200 other hazardous waste dump sites exist within 20-30 km, or that some of these other sites are both much larger and pose a possibly equal or greater threat to the environment.

Clearly, Niagara Falls, New York, has suffered not only the objective effects of its hazardous waste dumps, but it has received what is perhaps the most serious and prolonged adverse media attention arising from an environmental issue that has ever been encountered by a major tourism destination anywhere in the world.

3.2 TOURISM DATA AND ANALYSIS OF EFFECTS

Tourist visitation to Niagara Falls, N.Y. involves upwards of 4-5 million persons annually. This level, historically, is lower than that experienced in Niagara Falls, Ontario, since the U.S. side has somewhat fewer attractions to offer. Both the view of the falls and the quality of the surrounding park areas are generally conceded to be superior on the Canadian side. The New York Tour Book of the A.A.A. lists 24 attractions, 8 of "diamond" quality for Niagara Falls, Ontario; 16 attractions, 6 with "diamonds" are cited in Niagara Falls, New York. (One attraction in the diamond category above is actually shared - the Maid of the Mist.)

Despite differences in the number of attractions and the overall level of tourism visitation, the tourism situation in Niagara Falls, New York, must be considered to be as closely parallel to that in Niagara Falls, Ontario, as it is possible to obtain.

3.2.1 Patterns of Attendance at Major Tourism Sites

In choosing an observation period for potential effects on tourism, the years 1977-1983 were selected, for reasons noted in the previous section. Specific data were sought to serve as indicators of overall tourism activity, with the primary attention given to actual attendance counts taken at sites attracting the highest volumes of visitors, and that are operated by public agencies who have established a consistent and reliable system of collecting and recording attendance data over a number of years. The sites chosen were:

- the Prospect Point Observation Tower, operated by the New York State Office of Parks, Recreation and Historic Preservation,
- the Earl Brydges Artpark, also operated by New York State Parks,
- the Rainbow Bridge,
- the Whirlpool Bridge.

As was noted in chapter 2, various factors have influenced tourism in the U.S.A. over the time period in question. The 1979 price increases and shortages of gasoline in the U.S.A. were experienced in relatively severe form in Western New York. The economic recession of 1982, which persisted into 1983, also affected New York and the nearby northern industrial states more

severely than those in the "sun belt". The exchange rate of the U.S. dollar is considered to have had some adverse effects, since Canadian and foreign visitation is about 25% or more of the market in Niagara Falls, N.Y. One U.S. dollar cost about \$1.06 Canadian in 1977, and appreciated to over \$1.27 Canadian by 1983. As recently as 1976, it was under parity, at 98 cents. Weather and climatic factors can also have some influence: the summer of 1979 in the area was characterized by a wet July and a cool month of August; 1982 brought probably the poorest summer weather in the period, with a particularly cold, wet June and more cool weather in August.

Table 2, following, shows the recorded volumes of persons measured at the four indicator points mentioned earlier, for the calendar years from 1977 to 1983. For convenience in comparison, an index is calculated in each case by setting the 1977 value (the start of the time series, and a year prior to any influence of Love Canal on area tourism) equal to 100.

TABLE 2
INDICATOR ATTENDANCES, 1977-1983

x 1000

Index: 1977 = 100

<u>Year</u>	<u>Prospect Tower</u>		<u>Artpark</u>		<u>Rainbow + Whirlpool Br.</u>			
	<u>Atten.</u>	<u>Index</u>	<u>Atten.</u>	<u>Index</u>	<u>US Res.</u>	<u>Index</u>	<u>Can. Res.</u>	<u>Index</u>
1983	647	101.3	757	231.4	3214	107.4	2238	126.9
1982	633	99.1	707	216.2	3047	101.8	1921	109.0
1981	659	103.1	737	225.3	4168	139.3	1912	108.5
1980	572	89.4	565	172.8	4184	137.8	1851	105.0
1979	450	70.4	479	146.6	2759	92.2	1771	100.5
1978	671	105.0	504	154.2	2969	99.2	1822	103.3
1977	639	100.0	327	100.0	2993	100.0	1763	100.0

Sources: Prospect Tower and Artpark, New York State Office of Parks, Recreation and Historic Preservation.
Whirlpool and Rainbow Bridge, Statistics Canada.

Comparing indicators for 1978, the first year in which effects of Love Canal might be expected to appear, shows that modest increases occurred in all locations. The minor exception was a drop of under 1% of Americans entering Canada by the two Niagara Falls bridges. By 1979, the indicators show a decline in the order of a few percentage points over 1978. The exception is the Prospect Point Tower, which declined over 30%. This tower was undergoing a major reconstruction of its decks in 1979, however, which lead to severe constraints on the level of possible visitation in that year.

During the interval 1980 to 1983, most indicators can be seen to advance over the period as a whole, with some dips in 1982. All indicators by 1983 exceed their 1977 levels. (The 1981 and 1982 figures for U.S. residents crossing the two bridges are considered to be unusually inflated by the unique situation where the temporarily much lower price of gasoline on the Canadian side caused many American motorists to cross solely to fill up.)

3.2.2 Trends in Patterns of Recreational Traffic

As a responsive indicator of general levels of tourism in the area, traffic counts on selected sectors of the major highways most used by tourists were examined and analyzed for their recreational traffic component. This was performed using a method (from Wolfe, 1967) which has been tested in many situations and locations, and has been verified with recent survey station data.

The Robert Moses Parkway was considered to be the most representative tourist artery, and the section of this road between the Falls area and the Grand Island Bridge offered the most extensive set of data. (Information from Interstate Route 190 passing around and through Niagara Falls, and from the section of the Robert Moses Parkway extending north from the Falls area to Lewiston were also examined to corroborate and extend the data on the basic section chosen.) In order to provide a point of comparison, traffic data for the highest-volume sector of the Queen Elizabeth Way in the Niagara area on the Canadian side - the sector between the interchanges with Highways 405 and 420 - were subjected to a similar analysis over the same time period, 1977 to 1983.

Table 3, following, shows the estimated number of vehicle trips for recreation purposes carried on both of the above-noted road sectors in the period June 1 - Labour Day in each year. For convenience, an index setting 1977 = 100 is presented in each case.

TABLE 3
RECREATIONAL TRAFFIC VOLUMES, MAIN SEASON, 1977-1983

x 1000

Index: 1977 = 100

<u>Year</u>	<u>Robert Moses Parkway</u>		<u>Q.E.W. (405 - 420)</u>	
	<u>Volume</u>	<u>Index</u>	<u>Volume</u>	<u>Index</u>
1983	1131	107.4	1981	107.7
1982	1141	108.3	1848	100.4
1981	1085	103.0	1860	101.1
1980	1039	98.7	1850	100.5
1979	985	93.5	1826	99.2
1978	*	*	1845	100.3
1977	1053	100.0	1840	100.0

* No counts taken in 1978 on Robert Moses sector studied.

Sources: RMP traffic counts, seasonal counts and pattern factors from New York State Department of Highways.
QEW traffic counts and seasonal variation from Ontario Ministry of Transportation and Communications.

The trip volume figures in Table 3 include all recreational trips, and therefore will include shorter range local recreation trips along with the longer range tourist trips. Nevertheless, they show a broadly similar overall pattern of such trips on both sides of the border over the time period studied. In 1979, the year of the major U.S. energy problem and also a poor weather summer, recreational traffic declined on both sides of the river, with the decline on the American side being much more noticeable, as expected. In the recession year of 1982, which was also characterized by poor weather, the U.S. side recreational traffic increased, while the QEW sector declined very slightly.

In practice, differences of a percent or two cannot be relied upon to establish conclusions. Therefore, the main conclusion that can be drawn from the data in Table 3 is that the New York and Ontario volumes of recreational traffic exhibit very similar patterns of variation over the 1977-1983 period. The only exception to this is the greater drop-off of traffic on the U.S.

side in 1979, which could be attributed to the energy situation or to the Love Canal, or to both. Since the magnitude of the discrepancy in 1979 between the Canadian and U.S. sectors was only 6%, a very small drop in recreational traffic compared to most other areas of the U.S.A. in that year, it is not supportable to conclude that the drop was caused solely or largely by an impact from the Love Canal.

3.3 TRENDS IN CONVENTION BUSINESS

Data on convention activity in Niagara Falls, New York, were sought in order to ascertain whether Love Canal might have had an impact on this particularly sensitive sector of tourism. The convention delegate is motivated by both business and pleasure, and is usually considered to be a high spending visitor. The competition to attract convention business is keen, and both the facilities available and the image of the destination are considered to be important factors in achieving a growing level of convention business.

Niagara Falls made special efforts to improve its facilities in the 1970's, culminating in the opening of the Niagara Falls International Convention Center in 1976. This facility has over 138 000 sq ft (13 800 sq m) of exhibit space, and has many meeting rooms accommodating up to 12 000 persons. It occupies a prominent downtown site near the waterfalls and the Rainbow Bridge. Some smaller conventions use only hotel meeting space, but the presence of the Center has made a major difference to the city's ability to accommodate conventions.

Naturally, it takes some years to build convention business when a new facility opens, and the years immediately after the opening of the new International Convention Center were also those of maximum media attention to the Love Canal. Table 4, following, presents the data on convention activity in the period from 1977-1983:

TABLE 4
CONVENTION ACTIVITY, 1977-1983

<u>Year</u>	<u>Conventions Booked</u>	<u>Conventions Held</u>	<u>Ratio H/B</u>	<u>Delegates Attending</u>	<u>% Incr.</u>
1983	153	145	95%	135 000	+29
1982	171	133	78%	105 000	-12
1981	166	129	78%	120 000	+9
1980	154	121	79%	110 000	+12
1979	144	115	80%	98 000	+26
1978	165	98	59%	78 000	+47
1977	125	70	56%	53 000	+140

Source: Niagara Falls N.Y. Convention and Visitors Bureau.

The data clearly reflect a growth situation in convention business. The very high rates of annual increase in delegate attendance in the early part of the study period reflect the success of the new Convention Center in attracting conventions to the city. Such high percentage rates of increase are not sustainable for long, but the data show steady increases in numbers of delegates throughout the period, with the exception of a drop in 1982. As noted earlier, 1982 was a recession year, a factor that evidently resulted in a drop in delegate attendance despite an actual rise in the number of conventions held.

The data show no deflection of the growth trend in the potential influence years of Love Canal, 1978 and 1979. There is also no discernable influence from Love Canal in the immediately subsequent years, where one might expect to see an impact if any organizers had cancelled conventions in 1978 or 1979.

Overall, the convention data show that Niagara Falls, New York, has had continually increasing success over the study period in converting convention bookings to conventions actually held, as can be seen from the ratio of conventions booked to conventions held, given in the third column of Table 4, above.

By the early 1980's, Niagara Falls was attracting approximately twice as many conventions per year as either Buffalo or Rochester, both of which are much larger cities, but which lack an attraction with the drawing power of the falls.

To question or corroborate the convention trends observed from the data, and to obtain the opinions of those in the hotel sector of the convention business, personal interviews were held with representatives of all the major convention and group travel oriented hotels in Niagara Falls.

In all, the five largest properties in the downtown area were contacted, as was the largest property in the Buffalo Avenue area. These represent 85% of the available hotel rooms in the downtown sector, and 74% of the overall total in Niagara Falls. In each case, an interview was sought with the most senior person involved with group sales and convention business. Their length of experience in hotel administration in the Niagara Falls area ranged from three years to 26 years.

Each informant was quite sure that the Love Canal had not had any adverse impact on the convention trade in the city or at their hotel. None reported that they had experienced any cancellations of group or delegate bookings, either at the time of the most intensive publicity or subsequently. The improved convention facilities were noted as being increasingly well used, as was seen above from the Convention Bureau data. Most properties had either expanded their facilities or done upgrading over the study period. Scheduled to open in late 1985, a major new hotel is now under construction adjacent to the Winter Garden in the downtown area.

The property closest to Love Canal, The Best Western Red Jacket Inn on Buffalo Avenue, reported that the Love Canal situation had resulted in an increase in group and business bookings, partly because their meeting rooms were used for some of the hearings into the problem.

3.4 CONCLUSIONS ON TOURISM IMPACTS FROM LOVE CANAL

Taken all together, the indicators appear to show the following phenomena in Niagara Falls, N.Y. tourism in the period 1977 to 1983:

- 1978 showed a modest increase over 1977,
- 1979 apparently brought a decline in overall tourism over 1978, in the order of 5%,
- during 1980 and 1981, moderate increases occurred, to levels exceeding 1977,
- 1982 brought mixed signals, but probably a small decline occurred,

- 1983 levels of overall tourism grew over 1982, reaching volumes about 7-8% greater than 1977,

- data on convention business show strong increases in the period 1978 - 1980, years when the strongest effects from Love Canal, if any, should have been felt.

One must search very diligently in the data to detect any effects of the Love Canal on tourism. The first year of potential effect, 1978, actually showed increases of 2 or 3%.

The year 1979, which is the first one for which full effects, if any, might be expected to be observable, actually did show declines in some general tourism indicators, in the order of 5%. In that year, however, many tourist destinations in the U.S.A. experienced declines in tourism volumes as a result of the energy problems. The declines in many other tourist areas were much greater than 5%. Niagara area weather also did not cooperate in 1979, being much poorer than usual that season. Convention business in 1979 continued in a strong upward trend. An effect from Love Canal being a contributing factor in reducing general tourism along with the energy crisis and the poor weather in 1979 cannot be completely ruled out, but neither can it be supported by the data, since Niagara Falls came through that year relatively better than many other major tourism destinations in the U.S.A.

In looking at subsequent years, the 1980 to 1983 period shows moderate growth each year, with the probable exception of a pause, shown as a drop in the recession year of 1982 in some, but not all, of the major tourism indicators. By 1983, all indicators are uniformly advancing over their pre-Love Canal levels, despite a persisting recession and an increasingly adverse exchange rate affecting Canadians and most foreign visitors.

Overall, from the best and most relevant data available, it is not possible to conclude that the Love Canal had an adverse effect on tourism volumes in Niagara Falls, New York. At most, one might conclude that there may have been a temporary effect in 1979, but this conclusion is tenable only if one makes the unsubstantiated assumption that the energy crisis of that year, together with that year's poor weather, had a combined effect of less than about 5% on Niagara Falls.

Subjective information confirms that Love Canal had minimal if any deterrent effect on visitors. In an interview, the Tourism Manager of the Niagara Falls Convention and Visitors Bureau - who at the time of the Love Canal publicity was involved in answering visitors inquiries - it was stated that only two letters were received asking whether it was safe for tourists to visit Niagara Falls. Both parties were contacted by telephone after the tourist season. Both had, in fact, made their visit to Niagara Falls.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

Comparable Case Study

In order to examine the possible effect of a hazardous waste management facility on a major nearby tourism location, the case of the Rollins Environmental Services (Texas) plant and the San Jacinto Battleground tourism complex was chosen. This situation was selected from among nearly 700 possible sites because it best fulfilled the criteria established to test as stringently as possible for effects on tourism. The Rollins plant includes a landfill, physical/chemical/biological treatment, and an incinerator. The incinerator is a major operation, and was the first ever licenced by the EPA to burn PCB wastes. The start-up of PCB incineration attracted significant regional attention and protest actions. The waste management site is situated about 190 m from the sole highway access to the tourism location, and is about 1.5 km distant from the main tourist attractors. The Rollins plant is clearly visible from a high observation point on the site, and is identified by orientation plaques on the viewing platform. Over 1.3 million visitors annually attend the San Jacinto Park and related attractions.

The Rollins facility can thus be seen to be as comparable a waste management facility, in scale and scope, to that proposed by OWMC as could be identified given the criteria for tourism sites in its vicinity. It is much closer to a major tourist attractor than any of the eight OWMC candidate sites, and it is more directly located with respect to tourism access routes than any OWMC site.

Nevertheless, no effect on the pattern of tourism at the San Jacinto sites can be found, considering either objective data or subjective information. In fact, the San Jacinto site attendance held up better over the possible influence period, 1981 to 1983, than did the control attraction, the LBJ Space Center.

Parallel Case Study

As a measure of what is perhaps the worst case of an environmental problem resulting in intensive negative publicity

focussed on a tourism area, the situation of the Love Canal and its potential effect on tourism in Niagara Falls, New York, was studied as a parallel case. The hazardous waste problem of the Love Canal is a real and extensive one, arising from the unwise handling of a dumpsite containing many thousands of tons of chemical and hazardous wastes. It is compounded by the presence of some 200 further sites where hazardous wastes have been deposited over the years in the area, although the intense nationwide and worldwide media coverage focussed on the Love Canal.

Nevertheless, the objective data do not support a conclusion that the Love Canal had an adverse effect on tourism volumes in Niagara Falls, New York. At most, one might conclude that there may have been a temporary effect in 1979, but such a finding is contradicted by subjective information. It is also not supportable unless other factors such as the U.S. energy crisis of 1979 are presumed not to have affected tourism volumes very much, since the tourism decline in Niagara Falls, N.Y., in 1979 was only of the order of 5%, as caused by any and all factors.

Other Information

In the spring of 1985, an extensive spill of PCB-laden oil wastes occurred in Northwestern Ontario. For a distance of probably over 200 km, varying amounts of spill material were found on the road surface and the shoulders, and several cars were splashed with the material.

In a telephone interview with the President of the Kenora and District Chamber of Commerce in August, it was reported that there had been no discernable impact on area tourism in the season so far. The issue had been in the news media virtually all summer, even after the initial nationwide exposure at the time of the spill. The spill occurred just at the opening of the angling season, which is the busiest time of the year for most resorts in the area. In an interview with the Manager of the Publicity Board of Kenora, it was stated that tourism so far in 1985 had increased about 15% over 1984. There were only two parties who are known to the Board to have cancelled reservations as a result of the spill. Both were from the Winnipeg area, where the media gave extensive coverage of the spill. One cancellation was reported from Dogtooth Lake, where there was concern initially that some spill material from the road shoulder might have been washed by a heavy rain into the river feeding the lake. The other cancellation was at the Holiday Inn in downtown Kenora. In the period immediately after the spill, three inquiries were received, asking where the spill had been and what its nature was. There have been no questions received since that time. The prompt response to the spill with clean-up measures that did not

inconvenience the travelling public was cited as being a positive factor in avoiding any appreciable adverse effects.

Because several Niagara area tourist attractions (on both sides of the river) are members, and because they might have been aware if any attractions in other areas had been affected by waste management plants, improper waste handling problems or other environmental issues, a personal interview was held with the Executive Director of the International Association of Amusement Parks and Attractions, in Washington, D.C. This association has over 600 members throughout North America. The Executive Director had not heard of any member attractions in the Niagara area who had made him aware of any attendance losses as a result of the Love Canal problems in Niagara Falls, New York. He also could not recall having any member in any other location citing a nearby hazardous waste or other environmental problem as a factor in attendance losses.

While the foregoing information is not conclusive that tourism impacts cannot occur as a result of the construction of a nearby hazardous waste management facility, it strongly supports the overall conclusion of this report that there is no proof that any impact has in fact occurred.

Recommendations

The results in this report cover cases of impact on tourism from a hazardous industrial waste management facility and from a case of hazardous waste escaping to the environment. In each case, the chosen example was the best and clearest of its type that could be found and studied. The Corporation may wish, however, to cover a broader range of tourism impact situations from such causes as nuclear accidents, nuclear facility siting, major marine oil spills, etc. In this event, it is recommended that further case studies be conducted, using methods comparable to those in the present report.

BIBLIOGRAPHY

Comparable Case:

American Automobile Association, 1984; Tour Book, Texas, Falls Church, VA. pp 40-46.

Environmental Protection Agency, nd (1981?); Incineration of PCB's - Summary of Approval Actions, EPA Region 6 Office, Dallas, TX.

Gregory, R.D. (1981), "Design of Hazardous Waste Incinerators", Chemical Engineering Progress, April 1981.

San Jacinto Museum of History Society, nd; San Jacinto Museum of History - A Picture Book Introduction, Houston, TX. 5th printing, revised; 48 pp.

Parallel Case:

American Automobile Association, 1984; Tour Book, New York, Falls Church, VA. Pgs. 77-82.

New York State Department of Health, 1981; The Love Canal - A Special Report to the Governor and Legislature, Albany, N.Y., April 1981; 70 pp.

Wolfe, R.I., 1967; A Theory of Recreational Highway Traffic, Toronto, Ministry of Transportation and Communications, Report # RR 123; 55 pp.

Zeusse, E., 1981; "Love Canal - The Truth Seeps Out", Reason, February 1981, pg 16-33. (Reason Foundation, Santa Barbara CA)

Travel Data:

New York State Department of Transportation; Traffic Volumes, Albany, N.Y. Annual series.

Ontario Ministry of Transportation and Communications; Highway Traffic Volumes, Toronto. Annual series.

Statistics Canada; Travel Between Canada and Other Countries, Cat. No. 66-001, Ottawa. Monthly series.

OWMC and Consultant's Reports:

OWMC, 1985; Facilities Development Process, Phase 4A Report.

EDA Collaborative, 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Social Analysis; Appendix Volume 3, Visual Impact.

Ellis, Jack B. and Associates Limited, 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Social Analysis; Appendix Volume 5, Tourism Volumes and Potential Tourism Impacts.

Institute of Environmental Research, Inc., 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Social Analysis.

Laventhol and Horwath, 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Social Analysis; Appendix Volume 4, Tourism Impact.

M. M. Dillon Consulting Engineers and Planners, 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Site Selection.

M. M. Dillon Consulting Engineers and Planners, 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Transportation.

Monenco Engineering, 1985; Site Selection Process, Phase 4A: Selection of Preferred Sites - Engineering.

PART TWO: VOLUMES

TOURISM VOLUMES AND POTENTIAL
TOURISM IMPACTS

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EXECUTIVE SUMMARY

PURPOSE OF THE REPORT

The purpose of this report is to provide the Ontario Waste Management Corporation (OWMC) with an analysis of the potential impact on tourism in the general area of each of the candidate sites it is considering for construction of an industrial waste management facility. This work was commissioned through the Institute of Environmental Research, Incorporated, (IER) as a part of its program to assess potential social and economic impacts.

A companion report, Comparative and Parallel Studies of Tourism Impact from Waste Management Facilities, presents the results of two case studies of hazardous waste management and tourism situations: the Rollins facility near Houston, Texas; and the Love Canal in Niagara Falls, New York.

SCOPE AND METHOD

The scope of this study excludes the assessment of potential impacts on recreation facilities such as community parks and local recreation facilities, since this aspect is covered in the social impact studies by IER. Also, this study does not attempt to establish or evaluate potential impacts on tourist attendance or economic performance of tourism establishments, factors which are being studied by Laventhol and Horwath for IER as part of the overall socio-economic impact assessment program.

The method pursued in the analytical portions of this study consists of the following main steps:

- to evaluate the volume of recreational-purpose trips passing near each site on relevant sectors of provincial highways and regional roads.
- to split the recreational-purpose trips into those under 80 km (classed as local recreational trips) and those over 80 km (classed as tourist trips).
- to use information (from visual impact assessment by EDA Collaborative) on visual exposure of the facilities to tourists on each route segment to calculate an index of potential impact.
- to use information on current and projected truck traffic (from transportation impact study by M.M.

Dillon) to calculate an index of potential increased tourism/truck vehicle conflicts on access routes to the sites.

Results of research on perception are discussed to place in perspective the question of interpreting the potential exposure of tourists to a view of the facilities. A discussion is also presented of such factors as media influence, market position of the site area, etc., to gain further perspective on impact.

PREMISES AND POSTULATES

The premise underlying this report is that the OWMC will construct industrial waste management facilities on one or more of its candidate sites in general accordance with the possibilities presented in the report Site Selection Process, Phase 4A: Selection of a Preferred Site(s) - Site Selection, MM Dillon Ltd. 1985.

The primary postulate of this study is that the potential tourism impact is proportional to the number of tourists in a site area, and to the potential for them to become aware of the facilities.

A further postulate is that only road-oriented tourists will pass sufficiently near the sites to be potentially affected in their behaviour. Another postulate is that there are three ways in which tourists can become aware of the waste management facility: by becoming aware of them as they pass near a site; by hearing of them from others who are aware of the facilities; or through information from the media.

It is taken as a definition that a "tourism impact" is created only from a change in actual tourist behaviour, as measured in a changed level of tourism volumes or attendances.

STATUS OF DATA

All required data are readily available public data, provided by government agencies. The highway traffic data and the Canadian Travel Survey are available in lengthy and consistent time series. The Ontario surveys used in the analysis are one-time efforts and, therefore, less emphasis was placed on them.

MAIN FINDINGS

One of the Milton sites, LF-4N, is in the low range of tourism potential impact. There is little destination tourism in the area, and impact on tourism is unlikely. Site PI-1N in Milton has an index value in the high range, since it will be exposed to Highway 25 tourists and both directions of Highway 401 travellers, albeit the latter exposure will be a distant one. Impact on tourist views from the Escarpment is a slight possibility. Milton site PI-13N has a negligible index value, since it is not in the visual unit with either of the tourism corridors, and there is no tourism in the area.

The same situation applies in West Lincoln to the LF-3C site. The LF-9C site has a moderately low index value, since the tourist volumes on Highway 20, adjacent to the site, are low, and the area is not a tourist destination.

Site LF-1E in Niagara Falls has a moderate index of potential exposure. It will not be visible from the QEW, and the nearby regional roads have low tourist volumes. Site PI-27E, on the other hand has an index in the high range, since a full view of facilities on it will be possible by QEW motorists for about 40 seconds, and regional road tourists will also be exposed to it. The area is a tourist destination, but has such a high drawing power that it would take a very severe situation to cause a significant deterrence.

Impact from potential conflicts between tourists and OWMC truck traffic on the access roads is highest at site LF-3C. Site LF-9C has the next highest index value. For sites PI-27E and LF-1E, the index values are very low, mainly because the access along Niagara Regional Road NR 47 has such low tourist volumes and is fairly short.

The above findings rank the siting options on the basis of potential impacts. The likelihood is, however, that such potential impacts would not become actual impacts, in the sense of actually reducing the numbers of tourists in the various site areas. Exceptions to this could arise if highly adverse forms of media coverage develop; for example, as a result of a catastrophic accident.

CONCLUSIONS

Tourism impact, consisting of actual deterrence of tourist visits to a candidate site area, is extremely unlikely. One of the few ways in which an impact could conceivably arise is if the OWMC facilities suffer catastrophic failure or are operated so that they become a blatant environmental hazard, and/or are widely and persistently portrayed as such in the media. Another circumstance which conceivably could cause deterrence of tourists is extremely negative media coverage prior to construction. Such an effect would likely be very brief in duration.

Direct exposure of tourists to the facilities on each of the candidate sites varies considerably because of the differing tourist volumes of routes passing near the sites, and the differing visibilities of the sites from these routes. The sites with the maximum exposure are PI-1N and PI-27E. Next, but at a much lower level, would be LF-1E. Sites LF-4N and LF-9C have quite low potential tourism exposure, while sites PI-13N and LF-3C have virtually nil potential exposure.

Impact indexes for tourism/truck conflicts on access roads are lowest where the road sectors are short and tourist volumes low. This applies to sites PI-27E and LF-1E. Moderate index values apply to sites in Milton. Moderate to high values apply to the West Lincoln sites (mainly because of the length of access along Highway 20).

CHAPTER 1

INTRODUCTION

1.1 PURPOSE AND SCOPE OF THE REPORT

This report was commissioned by the Ontario Waste Management Corporation (OWMC) through the Institute of Environmental Research, Incorporated (IER). IER has been engaged by OWMC to assess the social and economic impacts of operating facilities to treat and dispose of special wastes at one or more of the candidate sites. The siting options and the nature of the facilities that might be constructed on them are described in the OWMC report, Facilities Development Process, Phase 4A Report, 1985.

Since tourism is both a social and an economic phenomenon, the OWMC desired to have, as a part of its program to assess social and economic impacts, a study of the tourism impacts that might occur in the area of each of the candidate sites which form the basis for the siting options among which it intends to choose to locate an industrial waste management facility complex in future.

A companion report, Comparative and Parallel Studies of Tourism Impact from Waste Management Facilities, presents case studies of tourism impact of existing situations in industrial and hazardous waste management: the Rollins facility near Houston, Texas; and the Love Canal in Niagara Falls, New York.

This report presents an overview and analysis, first of all, of the numbers of tourists who use the various highway corridors in the vicinity of each site. Then, consideration is given as to whether or not these tourists are likely to be able to perceive the waste management facilities from the tourist corridors. The visual exposure of facilities on each site was developed by EDA Collaborative Inc. in their report on visual impact assessment, which forms a part of the input to this report, as well as to the IER main report on social analysis. The relevance of visual impact to tourism impact arises from the postulate that the potential for tourism impact is, in part, proportional to the number of tourists in the site area and, particularly, to the potential for them to become aware of the facilities while passing near the site.

Potential tourism impacts can also arise, in part, because of information reaching potential tourists before they decide to make

a trip or visit an area. This report offers a discussion of factors involving such information and of their possible interaction with the motivations of tourists.

The report also discusses the differing amounts of road traffic conflict that could occur between tourist vehicles and truck traffic to a future OWMC facility on each site.

This report does not include discussion of the potential impact on community recreation facilities or those that are primarily used by persons coming from relatively short distances, which is covered in the social analysis report by IER.

It also does not cover the potential impacts on tourist attendance, patronage or economic performance of specific tourism establishments, or on the tourism economy of an area, which is covered in the report on tourism industry impacts by Laventhol and Horwath (Social Analysis; Appendix 4, Tourism Impact).

1.2 ARRANGEMENT OF THE REPORT

Chapter 2 of the report first presents some postulates on the process of tourism impact. Then, estimates of the number of tourists travelling near each site are derived. The data and methodology are discussed first, then the quantitative results are presented. A section on the relationship between a tourist being theoretically able to see facilities on a given site and actually becoming aware of them is then included. A discussion of the results on a site-by-site basis includes a qualitative estimate of what proportion of the tourists on a given corridor might gain this awareness. The sites are then ranked in order of the number of tourists who might become aware of them by travelling on an nearby road, as a measure of the potential tourism impacts.

Chapter 3 uses the results of Chapter 2 and the data on future projected truck traffic to an OWMC facility to develop an index of potential conflict between tourist vehicles and OWMC-bound trucks.

Chapter 4 presents a discussion of the means by which potential impacts on tourism could become actual impacts. The role of information presented in the media is considered, along with the type and extent of media treatment that might be required in order to trigger an impact on tourism. Media information is discussed in relation to some fundamental factors of the tourism process such as home location of the tourist, his motivation, and inherent tourism attraction power of various destinations.

Chapter 5 presents conclusions in a summary form.

CHAPTER 2

TOURISM VOLUMES AND EXPOSURE TO THE SITES

2.1 POSTULATES REGARDING THE TOURISM IMPACT PROCESS

In considering whether or not an impact on tourism can be created by a given action or by the presence of a particular hazardous waste management facility in an area, there are two basic possibilities. One is that the tourist has no prior knowledge of the presence of the facility, but passes nearby. The other is that the tourist does have prior knowledge. Under both cases, there are several possibilities that can or cannot cause an impact, as postulated below. In this regard, it is taken as a definition that an "impact" on tourism results only when an actual change in behaviour results; i.e., that a person will make no visit, will make fewer visits in future, or will discourage others from making visits in future. The end result of all of these possibilities is that if an impact occurs, it will result in fewer tourist visits.

It is postulated that the options, and the possibility of their causing an impact, are as set out below:

- the tourist has no prior knowledge of the waste facility:
 - must be able to see facility if not, no impact
 - must actually see facility if not, no impact
 - must recognize as waste facility if not, no impact
 - must be so disturbed by presence of waste facility that its presence outweighs the area attractions,
 - of destination area if yes, may avoid that destination in future, or may deter others
 - of corridor area if yes, may avoid route in future

- the tourist has prior knowledge of the waste facility:
 - obtained from friends, relatives if credibility of informant and urgency of message outweigh attractions, impact may occur; otherwise no impact
 - obtained from media, literature as above

Two categories of tourism impact are distinguished in this report, according to how they are initiated. The first may be termed a "direct" impact, since it will be presumed to arise from a tourist becoming deterred from an area by directly seeing it, or by hearing from someone else who has done so. This is the type of impact discussed in this Chapter. The second impact category may be termed a "media" impact, and will be discussed in Chapter 4.

The first step in assessing the relative magnitude of the potential for direct tourism impacts from waste facilities on any of the candidate sites is, clearly, to ascertain what volumes of tourists there are at present near each site. This is shown in the next two sections, 2.2 and 2.3.

The second step is to calculate or estimate what degree of exposure tourists would have to facilities on each site, in view of the above list of possible degrees of exposure. Section 2.4 discusses the perceptual factors involved, and in Section 2.5, the specific locational and siting factors are brought into the discussion of the sites, ranked by impact potential.

Further possible impacts to tourism could occur through conflicts between tourist vehicles and truck traffic to and from the OWMC facilities. These could cause, in addition to deterrence as discussed above, delays to tourist journeys, or accidents to tourist vehicles. The relative impact of OWMC-oriented trucks on roads near candidate sites is discussed in Chapter 3.

Chapter 4 presents a discussion of the factors of media and personal messages and how strong they must become in order to cause a deterrence impact on tourism.

2.2 METHODOLOGY AND DATA

The estimation of the numbers of tourists who visit or pass through small geographic units is a fairly difficult problem. Unlike the case for large areas, such as countries, there are no exact counts available. Furthermore, there is the definitional

question of just who is a "tourist".

The most widely-accepted definition of a tourist in domestic tourism studies involves a person on a trip, its purpose and distance. A "tourist" can be defined as someone on a trip which is 80 km or more, one way, from home, the purpose of which is personal pleasure reasons, or to visit friends or relatives. That is, business-purpose travel is excluded, as is any trip under 80 km from home. This definition is adopted for this report. The 80 km distance is used in the Canadian Travel Survey, performed by Statistics Canada for Tourism Canada.

The most reliable, consistent and detailed counts of geographical movements available in Ontario, and most other jurisdictions, are highway traffic volume counts. These are published annually by the Ministry of Transportation and Communications, Ontario, and cover all provincial highways in fairly detailed segments or sectors, and give averaged daily traffic volume figures on an annual and partial seasonal basis. These traffic counts include, of course, all traffic, including commercial vehicles as well as cars. By themselves, they make no specific attribution of the number of trips according to the purpose of the trip; such as business, pleasure, etc.

Fortunately, a method exists whereby the proportion of highway traffic volumes that are attributable to pleasure recreational trips can be estimated (Wolfe, 1967). This method was developed in Ontario and was used for several years during the 1970's when an active program of constructing and improving highways carrying largely recreational traffic was underway. It also has been validated against count and survey data available from several other states and provinces, and for years up to 1979.

When applied to the commonly-available traffic count data, the method yields daily numbers of recreation-purpose vehicle trips for summer weekdays and weekend days. By the use of appropriate factors, these results can be expanded to yield a total volume of recreational trips for an entire summer season. For the purposes of this report, a "summer season" is defined as the period between June 1st and Labour Day, in any given year.

Having arrived at an estimate of recreational trips per season for a given highway sector, it is necessary to separate the shorter-range trips, under 80 km, from "tourist" trips, defined as 80 km and over. The rates at which persons make non-business auto trips of 80 km and over can be derived from the Canadian Travel Survey. Also, the Ontario Recreation Survey and the Ontario Tourism Study (see Bibliography) contain information on recreational and tourism trip-making rates for shorter lengths of trip. By considering all of these sources of information, an estimate can be made, for a given highway sector of interest, of the proportion of recreational trips on it which fit the

definition of tourist trips given earlier.

This last step yields an estimate of the total number of tourist vehicle-trips in a summer season for each highway sector. The number of actual tourists - or persons on a tourist vehicle-trip - can be obtained by applying an average vehicle occupancy number, one which applies to longer-distance pleasure trips.

2.3 TOURISM VOLUME RESULTS

The process described in the previous section was applied to the sectors of provincial highways and relevant regional roads passing near each of the candidate sites. The necessary data for regional roads are available in a form similar to that issued by the Ontario Ministry of Transportation and Communications for provincial highways.

The estimated tourist volumes on the road sectors studied are presented in Table 1, on the following page. Only in the case of the Niagara Falls sites are there nearby regional or municipal roads adjacent to or near the sites that carry significant amounts of longer distance recreational traffic. In Chapter 3 when potential conflicts between tourist vehicles and OWMC-oriented truck traffic are considered, regional roads farther away from the sites must be considered, and the appropriate sectors in all municipalities are added at that point.

The estimated recreational traffic and tourist volumes in columns two and three of Table 1 must not yet be taken as numbers of tourists to whom the facilities are potentially visually exposed. Several other factors intervene, both physical and perceptual, as noted earlier. These are discussed in the next section of this report.

TABLE 1

TRAFFIC, RECREATIONAL AND TOURIST TRIP VOLUMES

<u>Highway</u>	Approx. Dist. to Site (km)			Volumes x 1000		
				<u>AADT(1)</u>	<u>Recreational Veh.-Trips/ Season(2)</u>	<u>Tourist Person- Trips(3)</u>
Milton	LF-4N, PI-1N, PI-13N					
25	2.6	adj.	5.0	7.2	360	120
401	8.0	7.5	6.4	38.5	2250	2300
West Lincoln	LF-3C, LF-9C					
3	8.0	10.0		3.9	240	360
20	5.0	adj.		3.5	210	330
Niagara Falls	LF-1E, PI-27E					
QEW	3.8	.2-2.0		14.8	1050	1600
NR 98	2.3	adj.		4.1	300	300
NR 27	adj.	3.8		2.8	50	20
NR 47	adj.	1.6		0.4	20	9

Notes: (1) AADT = Annual Average Daily Traffic; Source: Ontario MTC for provincial highways; Regional Niagara for Niagara Region roads. Data apply to the year 1983.
 (2) Calculated by the method of Wolfe (1967); season total applies for period from June 1 to Labour Day.
 (3) Calculated by factoring out the proportion of short-range recreational trips; then applying average tourist vehicle occupancy factor. (Both factors are estimated specific to each road sector).

In order to obtain a preliminary assessment of visual sight lines, evident proportion of tourist traffic, and a general impression of each site area, the consultant visited each site. Each access corridor and nearby highway or regional road sector was driven several times at various speeds. Topographic maps of the area were used to obtain a rough estimate of what the visibility of facilities on each site from each road sector might be.

This assessment was a preliminary one, because the question of visual intrusion, sight lines and distances, and measures to mitigate visual intrusion of the facilities into the landscape were being developed simultaneously by EDA Collaborative Inc. The results of their studies, as incorporated in their report on visual impact assessment to the IER, have been incorporated in the final section of this Chapter. The reader is referred to the EDA report for the details of their assumptions and findings.

In turn, Jack B. Ellis and Associates Limited provided EDA with the volumes of recreational and tourist traffic on the potentially influenced road and highway sectors, to assist them in their assessment of visual impacts.

2.4 DISCUSSION OF PERCEPTUAL FACTORS

As noted earlier, the volumes of tourists shown in Table 1 are not all likely to have visual exposure to waste management facilities on the candidate sites. Two main factors will modify these numbers, in some cases reducing them to zero. The first factor is the actual visual sight lines possible through distance, topography, intervening objects or vegetation, or mitigative measures such as screening. This factor is discussed later, based on the results of the EDA visual impact study.

The second factor may be termed "perceptual", and refers to the phenomenon that not all persons who can see an object in the landscape will, in fact, see it. Then, not all of those who do see it will notice it. Further, not all those who notice an object will recognize it. Also, only a portion of those who recognize an object will be disturbed by it. Finally, only a fraction of those who are disturbed by the presence of an object in the landscape will be so disturbed by it that they will alter tourist travel behaviour as a consequence - either by avoiding the area themselves in future, or by telling others of their negative perception of the area and advising them to avoid it.

There is a large and growing body of literature which covers the field of perception, much of which deals with the processes described above. There are results which correlate the time and

angle of visual exposure needed for actual sighting of an object, and for its recognition. Some of these results are oriented to the study of signage along roads, others to visual displays such as for aircraft pilots. It is not intended to provide a comprehensive overview of the whole field of perception in this report, but the Bibliography offers a selection of pertinent references.

Schiff (1980, pp. 258 et seq) offers a discussion of the absorption of information from static and dynamic binocular vision. He notes that beyond about 400 feet (135 m), the useful input from binocular vision is negligible. Since all candidate sites are of sufficient size that at least a 135 m setback of facilities from even an adjacent road sector is possible, binocular vision will not be useful as an aid to a viewer trying to perceive what he is looking at.

Further discussion by Schiff (who cites a large number of relevant researchers in his work) note that the time duration of visual exposure and the angle, or number of degrees from straight ahead at which it occurs, are critical factors in recognition of objects from a dynamic or moving viewpoint, such as an automobile. The literature cites a flash view of 0.2 seconds as being sufficient to recognize a large and familiar object, such as a letter of the alphabet. Each additional 10-15 milliseconds are sufficient to recognize one more character. Thus, a typical road sign can be visualized with a 1-2 second total exposure. An object which is more complex or less familiar to a viewer than, say, a letter of the alphabet, requires much more time to be perceived, even at the initial level. Research shows that the required exposure time goes up exponentially with the complexity of the object.

The initial exposure is recorded in a person's short-term memory. Recognition sufficient to initiate a non-reflex action - such as to slow down when confronted with a sign indicating a speed limit ahead - requires the viewer to transfer the information to long-term memory. Hochberg (1978) discusses research showing that details of an object are seen only in the centre of vision, called the "fovea". Perception of an object occurs through a succession of fixations upon it, at the rate of 4 to 5 per second, assuming that the viewer wishes to explore it. Hochberg and others identify the following stages of perception. First, there is a momentary visual sample taken, lasting about 200 milliseconds. Then, the information received on the object is extracted from other visual information that is also being received, compared with images already in memory, and encoded. At this point, storage of the information occurs, either in short-term or long-term memory. Since short-term memory can hold information on only 5 to 9 independent items, depending on the individual, there is severe competition among objects to be transferred to long-term memory. The selection process involved

in this transfer is not well understood, since it depends on the mood, interests, and other thought processes of the individual, as well as on personal capacity to process visual information. Finally, to complete the gathering of information from an object whose perception is in long-term memory and for which a conscious desire exists to explore further, there is a process of combining information from successive samplings of the object.

The relevance of the findings in the literature to the question of a tourist travelling along a road or highway near an OWMC facility to his or her likelihood of perceiving it is clear only for some portions of the perceptual process. The time and angle of exposure can be calculated from visual unit boundaries, road lengths and orientations, and average speeds. What cannot be given quantitative values is the likelihood that a tourist viewing part of the facilities, such as the processing plant or an incinerator stack, will recognize them or identify them as having to do with the processing of hazardous wastes.

Certainly, if there is a highway adjacent to a given site, the size of the sign identifying the facility, its placement, and the information presented on it, will all influence whether a passing tourist will recognize that he is near an industrial waste management facility.

In the case where a tourist is not made aware through signage of what he is passing, the recognition of what he sees - and whether it is actually seen - depend on the "foreground/background" resolution of objects in his field of vision (Hochberg, 1978). Put simply, a tourist will be more likely to notice objects that are massive, unusually shaped, and that do not "fit" with their background. A special waste facility may meet this set of high-perceptibility criteria if it is located in a rural area, not visually screened, and is close to the moving viewer. It is less likely to meet them if the facility is located in an industrial area with many other similar shaped objects.

Since it is not possible to quantify the proportion of tourists passing near a site who will proceed to the second stage of the postulates given in Section 2.1 - i.e., of actually seeing the facility - let alone estimate the degree of "disturbance" they engender in his mind, many of the comments on sites in the following section will be general.

The comments will rank the sites by exposed volumes of tourists, and note that that they are only "potentially exposed".

2.5 SITE DISCUSSION FOR DIRECT IMPACT POTENTIAL

This section draws heavily on the visual impact work of EDA, referred to earlier. In particular, their work shows whether or not a particular road sector will be in the "visual unit boundary" with industrial waste management facilities on the site. Their drawings also show distances and angles from points on the road to the facilities. Their analyses cover various cases of possible facility construction; e.g., integrated, partially integrated. In this report the maximum range of stack height possibilities will be considered. Usually, this involves the siting of an incinerator with a stack height of a maximum of 100 m in some cases (noted in EDA report). Site LF-4N is presumed not to have an incinerator, as noted in OWMC Facilities Development Process, Phase 4A.

Table 2, on the following page, gives a summary of the sites with their potential for direct exposure to tourists. The number of tourists on each road sector is taken to be equal to the total estimated number from Table 1, earlier, unless there are special factors noted in the table. That is, no de-rating of the impact potential is shown even though the view may be in the background, or in the middleground and at an angle greater than 30 degrees.

Table 2 shows the sum total of potentially exposed tourists on all road sectors from each site. The table contains a rough index of potential impact, calculated as follows:

Index = Total number of tourists travelling on all routes
x (0.3 if site is in a corridor area; 1.0 if destination)
x (0.3 if site area land-use is industrial; 1.0 if rural)
x (0.3 if site will not have incinerator; 1.0 if it will)

The above-defined index, therefore, presumes that a waste facility has full potential impact if the site is in or near a destination area for tourists; is surrounded by primarily rural or non-industrial land uses; or if it may potentially have an incinerator. A significant reduction is presumed for each of the foregoing that does not hold. Clearly, this index is very approximate, and cannot be taken as a precise measure. Nevertheless, it can serve as a way to compare the sites for potential exposure to tourist impact.

TABLE 2

RELATIVE SITE EXPOSURE TO DIRECT TOURISM IMPACT

<u>Site</u>	<u>Highway</u>	<u>Locational Remarks</u>	<u>Nature, Time of Exposure</u>	<u>Thousands of Tourists</u>
Milton	LF-4N 25 401	middleground not in v.u.*	ample nil	120 nil
			Total	<u>120</u>
		Index = $120 \times 0.3 \times 1.0 \times 1.0 =$ <u>36</u>		
	PI-1N 25 401	adjacent background	ample fleeting, distant	120 2 300
			Total	<u>2 420</u>
		Index = $2\ 420 \times 0.3 \times 1.0 \times 1.0 =$ <u>726</u>		
	PI-13N 25 401	not in v.u. not in v.u.	nil nil	0 0
			Index = <u>0</u>	
West Lincoln	LF-3C 3 20	not in v.u. not in v.u.	nil nil	0 0
			Index = <u>0</u>	
	LF-9C 3 20	not in v.u. adjacent	nil ample	0 330
			Total	<u>330</u>
		Index = $330 \times 0.3 \times 1.0 \times 1.0 =$ <u>99</u>		

TABLE 2, cont.

<u>Site</u>	<u>Highway</u>	<u>Locational Remarks</u>	<u>Nature, Time of Exposure</u>	<u>Thousands of Tourists</u>
Niagara Falls LF-1E	QEW	not in v.u.	nil	0
	NR 98	middleground	brief ex- posure	300
	NR 27	middleground	ample	20
	NR 47	middleground	ample	$\frac{9}{9}$
			Total	329

$$\text{Index} = 329 \times 1.0 \times 1.0 \times 1.0 = \underline{329}$$

PI-27E	QEW	full view	approx. 40 sec.	1 600
	NR 98	adjacent	ample	300
	NR 27	not in v.u.	nil	0
	NR 47	adjacent	ample	$\frac{9}{9}$
			Total	1 909

$$\text{Index} = 1\,909 \times 1.0 \times 0.3 \times 1.0 = \underline{573}$$

* not in v.u. = not in visual unit, as defined by EDA.

From the above, we can rank the sites in order of descending potential to cause direct tourism impact:

Least potential impact

LF-3C PI-13N
LF-4N
LF-9C
LF-1E
PI-27E
PI-1N

Most potential impact

Sites listed on the same line are roughly equal in impact potential.

CHAPTER 3

POTENTIAL FOR TOURIST/TRUCK CONFLICTS ON ACCESS ROADS

3.1 DATA INPUTS

As part of their efforts in analyzing transportation impacts from the construction of industrial waste management facilities on the various candidate sites, M. M. Dillon Consulting Engineers and Planners have calculated various factors. (See: MM Dillon, Phase 4A: Transportation, 1985.) Among these is the year 2000 traffic volume (Annual Average Daily Traffic, AADT) on influence roads and access roads. They also have calculated the numbers of truck movements involved to the OWMC facilities, based on attaining a waste input of 300 000 tons per annum, and have assigned this truck traffic to the various road sectors.

Many of the minor access roads considered in their study have little or no tourist volumes on them. Some, however, do have a measureable amount of tourist traffic. Wherever such traffic co-exists with truck traffic to the OWMC facility, the majority of which will be three-axle or larger vehicles, there is a potential for conflict.

In order to assess this potential, a methodology similar to that used by M. M. Dillon to evaluate an index of conflict with agricultural vehicles has been adopted. This index is calculated as follows:

$$\text{Index} = (\text{Change in AADT}) \times (\text{Link Length}) \\ \times (\text{Number of Tourist Vehicles})$$

Change in AADT is defined as follows:

$$\text{Change in AADT} = \frac{(\text{Year 2000 AADT}) + (\text{OWMC AADT})}{(\text{Year 2000 AADT})}$$

The values for OWMC AADT will depend on the process and whether the sites have integrated or only partially integrated facilities. All cases were considered by Dillon.

The number of tourist vehicles for each link was an interim

calculation done earlier as input to Table 1. The number applies to a total "season", taken as June 1 - Labour Day. To estimate the potential conflict with trucks, this number had to be factored down to include only tourist trips that take place on a weekday, since the transport of wastes is presumed to be a 5-day per week operation, excluding statutory holidays as well.

Each road sector studied for tourism traffic has such a breakdown as a byproduct of the Wolfe method (Wolfe, 1967). The proportion of weekday tourism varies among the road sectors between about 30% to 50%, being higher near tourism destination areas. The factor by which to project tourist traffic for each link from 1983 values to year 2000 values was taken as the ratio of the relevant AADT's. That is, the approximation was made that tourist traffic would grow in the same proportion as total traffic.

3.2 CALCULATION OF TOURIST/TRUCK CONFLICT INDEX

Table 3, on the following page, shows the results of applying the calculations outlined above.

The index calculated in Table 3 has been constructed in a manner to make it as comparable as possible to other traffic-type conflicts indexes in the overall study.

The index values yield a descending order of truck/tourist conflicts which can serve in ranking the siting options. A recapitulation will be given in the Conclusions, but the site ranking from least impact to highest impact is as follows:

Least potential conflict LF-1E, PI-27E, PI-27E/LF-1E

PI-13N/LF-4N

LF-9C

Most potential conflict

LF-3C

TABLE 3
TOURIST/TRUCK CONFLICT INDEX

<u>Site</u>	<u>Access*</u> <u>Road</u>	<u>Link*</u> <u>Length</u> (km)	<u>Change*</u> <u>in AADT</u>	<u>Tourism Vehicles per</u>		
				<u>Season</u>	<u>Weekday</u>	<u>Per Day</u>
PI-13N/LF-4N	Hwy 25	11.4	1.001	51 000	15 300	390
			Index = 1.001 x 11.4 x 390 =			
						<u>4 450</u>
LF-1E	NR 47	1.2	1.072	3 500	1 800	45
			Index = 1.072 x 1.2 x 45 =			
						<u>58</u>
PI-27E		same as above				<u>58</u>
PI-27E/LF-1E		same as above				<u>58</u>
LF-3C	Hwy 20	9.3	1.030	157 400	62 900	1 610
			Index = 1.030 x 9.3 x 1 610 =			
						<u>15 460</u>
LF-9C	Hwy 20	5.3	1.030	157 400	62 900	1 610
			Index = 1.030 x 5.3 x 1 610 =			
						<u>8 810</u>

* as supplied by Dillon, worst case (longest access link, highest tourist volume) selected among all link sectors.

CHAPTER 4

MEDIA AND OTHER IMPACT CONSIDERATIONS

4.1 GENERAL FACTORS THAT CAN CREATE TOURISM IMPACTS

Chapter 2 addressed the question of how many tourists there are, in a typical summer season, who might be able to gain a direct awareness of each of the candidate sites. By extension, these are also the numbers of tourists who might be able to make others aware of them indirectly, through word of mouth. Persons who are potential or actual tourists to an area could also become aware of the waste management facilities on a given site through information reaching them from various media; radio, television, newspapers, magazines, newsletters, etc.

Regardless of how large the actual number is of tourists or potential tourists who gain an awareness, by whatever means, of the presence of waste management facilities in a particular location, these numbers should by no means be taken to represent the numbers of tourists who might actually be deterred from visiting the site areas.

Deterrence to tourist visitation in the general area of a waste management facility can conceivably arise in two ways:

- if the presence of the facilities significantly impairs the amenity, visual or otherwise, of an entire area (i.e., not just the immediate site vicinity), or
- if there is extremely negative and persistent adverse media coverage of the facilities, to such a degree that some persons perceive that exposure to a dangerous health or safety factor could result from visiting even the general area of the site. This perception must be so strong as to outweigh their desire to visit the area for its known attractions.

The question of possible amenity impairment must be considered at two levels. One level is the immediate vicinity of the sites, and possible impairment of amenity at this level is reported on by EDA. However, none of the candidate sites has recreational or tourist outlets of more than local interest in its

immediate area; i.e., within 2 km. The second level of possible amenity impairment is the broad general area of the sites, say up to a 10-12 km radius. Amenity impairment over such a broad area is highly unlikely to arise from well-designed waste management facilities. Area amenity, in any case, is a factor of importance only to site areas that act as destinations for tourists, as opposed to being near a corridor along which tourists pass enroute. In this study, only the Niagara Falls area and the Milton/Niagara Escarpment area can be considered as tourist destinations.

In the case of Milton, the EDA report on visual impact shows that it will be possible to view an incinerator facility on sites LF-4N, PI-1N or PI-13N from viewpoints on the Niagara Escarpment, though site LF-4N is not now a candidate site for an incinerator. The distance from either site to these viewing points is 4-12 km or more, and it would be difficult to support a conclusion that any tourist viewing a single incinerator stack from that distance would be so discomfitted as to not make a visit, or to discourage others from visiting.

In the case of Niagara Falls, an incinerator stack on site PI-27E would be about 7-8 km from the Falls, and on LF-1E, about 10 km. Certainly, any stack on either site would be invisible from ground level at any of the major tourist attractions in the area. From the various observation towers - the Skylon, 160 m; Maple Leaf Village Tower, 108 m; Minolta Tower, 100 m, EDA show that it will be possible to view a high incinerator stack on LF-1E or PI-27E, but only by turning one's back to the Falls, the twin cities and the other usual points of interest. Such a stack would appear isolated in its sector of the horizon - assuming present industrial patterns are retained - but many other industrial stacks in other horizon sectors are now evident from these tower locations, including Cyanamid's and the entire chemical manufacturing complex on the U.S. side. It would be very difficult to establish a case that any real impairment of area amenity would be constituted by the presence of waste management facilities on either site, or that any tourists would be deterred by such impairment.

4.2 ROLE OF MEDIA INFORMATION

Media information can reach a person prior to visiting a tourist area, and can have definite effects on decisions to visit. Normally, media information creates a positive desire to visit an area, which is why so many tourism promotion dollars go to advertising.

The media can also present negative information about a tourist area and, thereby, tend to deter visits. Such

information, to act as a deterrent, must be about factors that specifically affect tourists and not just the resident populations of the tourist areas. Such factors may be objective ones, such as high prices, high rates of crime against tourists, low tourist capacity or overcrowding, actual destruction of tourist amenities by natural disasters or their temporary impairment such as fouling of beaches by oil spills, frequent incidence of health problems among tourists, or negative political factors. Sometimes, subjective factors are involved, such as the fashionableness of a resort or of the activities one can pursue.

With respect to adverse media experience of the proposed OWMC facilities, there is no evidence to suggest that they would create or contribute to any of the above-noted factors. Therefore, any deterrent effect through media exposure of the facilities would have to arise in one of two ways:

- from an extremely negative picture of the facilities being presented in the media prior to their construction, or
- through media coverage of persistent and serious problems if such were to arise during the operation of the facilities. Included would be such factors as major accidents, catastrophic fires or explosions, persistent emissions of harmful pollutants, or persistent negligence in operations.

The first condition noted above might be fulfilled if serious distortions of the actual nature and objective effects of the proposed facilities are presented by those who oppose the construction of the facilities. If the extent of the perceived problem is made large and media coverage of it is widespread and persistent, some negative effects on tourism might be felt. It is likely, however, that any negative effect would be temporary. The companion report to this study, Comparative and Parallel Studies of Tourism Impact from Waste Management Facilities, found that no impact on tourism in Niagara Falls, New York, occurred even after the intense media exposure of the problems arising from hazardous wastes in the Love Canal site.

4.3 ROLE OF MARKET POSITION

The susceptibility of any tourism destination to possible reductions in its market depends to a great extent on its inherent attractiveness and uniqueness. The more attractive, unique destination will be less affected by area-specific price increases, crime, environmental problems and so on, than a

run-of-the-mill destination for which many reasonable alternatives present themselves.

In this study, the Niagara Falls area is by a considerable margin the most attractive, unique tourism destination among the study municipalities. It ranks high on such factors in Canada, and even in North America. The Milton/Niagara Escarpment area ranks much lower on these factors, and the Mississauga and West Lincoln areas literally do not rank at all, since they are not tourism destination areas.

A significant portion of the tourism market of Niagara Falls is made up of overseas visitors and those coming from very long distances from other parts of Canada and the United States. Such persons have a strong desire to see one of the "wonders of the world", and would have a very high threshold of deterrence to visit. They are also the market segment most likely to stay longer and spend more money at their destination.

Niagara Falls also benefits greatly from its favourable market location, being within a two-hour drive of almost 7 million people. It is this audience that has the greatest potential exposure to any adverse pre-construction publicity about OWMC facilities, since media attention will be most focussed on this area - with the likely exception of the U.S.A. portion, some 2.3 million people. If any effect occurs for this reason, it is likely to be temporary. The only exception to this could be if such facilities were to be operated in a dangerous and incompetent fashion and extensively covered in the media.

It should be noted that the OWMC waste management facilities could serve as a positive attraction for small volumes of tourists. If it is possible to tour the facilities, or for OWMC to sponsor meetings of interested persons nearby, there could be a market for several hundred to a few thousand visitor-days of special interest tourism in the general area of the facility site. This market would consist of students, process specialists, waste management and environmental specialists. In addition, there could be a positive diversion of casual visitors from the Southern Ontario areas in and near the "Golden Horseshoe" who might wish just to see the facilities. It is not feasible to make even a rough estimate of how many could be so attracted, but the possibility definitely exists that the facilities could represent a source of pride for Ontario and the site area, through embodying a sound and progressive solution to a ubiquitous problem of our industrial society.

CHAPTER 5

CONCLUSIONS

The numbers of tourists who potentially could become aware of Ontario Waste Management Corporation facilities on any of the candidate sites varies considerably.

The sites LF-3C and PI-13N would have negligible exposure to tourists. Sites LF-4N and LF-9C are also very low in potential direct tourism impact. Sites PI-27E and PI-1N are found to have the highest impact potentials. Next, but much lower, is site LF-1E.

Impact from potential conflicts between tourists and OWMC truck traffic on the access roads is highest at site LF-3C, largely because the access route considered to be affected is fairly long. Site LF-9C has the next highest index value. Sites PI-27E and LF-1E have low index values, mainly because the access routes along Niagara Region roads have low tourist volumes and are short in length.

A review and enumeration of the ways in which tourism could be affected by waste management facilities in an area shows that actual reductions in visitor numbers are highly unlikely to occur. One of the few circumstances in which deterrence to tourism could arise is from extremely negative media coverage prior to construction. Such an effect would likely be temporary.



BIBLIOGRAPHY

General:

Wolfe, R.I., 1967, A Theory of Recreational Highway Traffic; Toronto, Ontario Ministry of Transportation and Communications), Report RR 123; 55 pp.

Ontario Ministry of Transportation and Communications, Highway Traffic Volumes; Toronto, annual series.

Roads Division, Regional Niagara Public Works Department, Traffic Volumes on Niagara Regional Roads; Thorold, annual series.

Travel Data:

Ontario Ministry of Tourism and Recreation, Ontario Travel Survey; Toronto, 1983.

Ontario Ministry of Culture and Recreation, Ontario Recreation Survey; Toronto, volumes I-IX, 1977 to 1980.

Canadian Travel Survey; conducted quarterly from June to December 1982 and January to December 1984 by Statistics Canada, sponsored by Tourism Canada. Publications are:

Travel Trends; Tourism Canada, quarterly series.

Canadian Travel Survey Research Bulletin, Tourism Canada, quarterly series.

Statistics Canada, Canadian Travel Survey 1982; Cat. No. 87-504, March 1984.

Statistics Canada, Travel-log; Cat. No. 87-003, quarterly series (includes other travel data).

Perception:

Bartley, S.H., 1969; Principles of Perception, 2nd ed., New York, Harper & Row.

Hochberg, J.E., 1978; Perception, New York, Prentice Hall.

McBurney, D. and V.B. Collings, 1984; Introduction to Sensation/Perception, New York, Prentice Hall.

Smith, K.U., 1962; Perception and Motion: An Analysis of Space-Structured Behavior, Philadelphia, Saunders.

Schiff, W., 1980; Perception: An Applied Approach, Boston, Houghton Mifflin.

Piaget, J., 1969; The Mechanisms of Perception, New York, Basic Books.

OWMC and Consultant's Reports:

OWMC, 1985; Facilities Development Process, Phase 4A Report.

EDA Collaborative, 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Social Analysis; Appendix Volume 3, Visual Impact.

Ellis, Jack B. and Associates Limited, 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Social Analysis; Appendix Volume 5, Comparative and Parallel Studies of Tourism Impact from Waste Management Facilities.

Institute of Environmental Research, Inc., 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Social Analysis.

Laventhol and Horwath, 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Social Analysis; Appendix Volume 4, Tourism Impact.

M. M. Dillon Consulting Engineers and Planners, 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Site Selection.

M. M. Dillon Consulting Engineers and Planners, 1985; Site Selection Process, Phase 4A: Selection of Preferred Site(s) - Transportation.

Monenco Engineering, 1985; Site Selection Process, Phase 4A: Selection of Preferred Sites - Engineering.